# KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

# SEPTEMBER 2011 ROUTINE OWNERS INSPECTION

Prepared for: The Remedium Group

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Inspection Date: September 29th, 2011
Report Date: January 12th, 2011

**INSPECTION DATE:** September 29th, 2011
**REFERENCE:** **SEPTEMBER 2011 ROUNTINE OWNERS INSPECTION**

## 1.0 OBJECTIVES

The end of September 2011 routine owner's inspection was conducted on Thursday, September 29th, 2011. Personnel included Kurt Hafferman, P.E. and Dan Nelson from BHI and Jeremy Peterson from Chapman Construction.

The inspection was conducted as a routine owner's inspection. Project tasks to be completed included:

1. Safety meeting with Chapman and BHI
2. Check LRC-06 flows
3. Check Carney Creek and Lower Rainy Creek flows
4. Check Upper Rainy Creek and Fleetwood Creek inflows
5. Investigate upper Fleetwood Creek Pond
6. Read reservoir level
7. Record piezometer readings
8. Inspect the embankment dam
9. Inspect principal spillway
10. Inspect outside and inside of drains
11. Read flumes and weirs below the drain outlets
12. Read staff gauges in all streams above and below drain outlet channel
13. Download transducer data and reset transducers
14. Decontaminate and depart site

## 2.0 RESULTS

BHI met with Chapman Construction at 9:30 a.m. and the routine owner's inspection began at 9:45 a.m. and was completed at 1:30 p.m. The weather was clear, with calm winds. The temperature ranged between 40°F and 60°F. There were no weather impediments that affected the inspection. Copies of photographs from the date of the inspection are included in Appendix 1.

Copies of the Routine Owners Inspection Report as completed after the inspection and copies of the field notes are provided in Appendix 2. The following are the results of each of the thirteen (13) tasks described above;

1. Safety Meeting: Jeremy Peterson has been assigned as the health and safety officer and is responsible for equipment condition, decontamination procedures and over-all KDID site safety. The safety meeting with Chapman Construction included discussions of the work tasks and procedures for the day, equipment safety and operation, emergency procedures, truck traffic onsite and overall job site safety. Environmental Restoration (ER) continues operations at the amphitheatre and has staged decontamination equipment onsite. Equipment was checked, no issues were found and all personnel were equipped and prepared for the site conditions. Standard equipment used included: double Tyvek suits, rubber booties, double vinyl gloves and North® full face mask. Booties were taped at the top and Tyvek suits are taped at the zipper on the outer suit.

2. The LRC-06 flume was checked at the end of the inspection. The flume was clean and clear and a gauge reading was taken and recorded.
3. Carney Creek and Lower Rainy Creek Flows: Flumes CC-02 and LRC-02 respectively were read. Flumes were clear and gauge readings were taken and recorded, gauge readings are as follows;
    a) The CC-02 Flume was read and the gauge height was recorded at 0.15 ft.
    b) The LRC-02 Flume was read and the gauge height was recorded at 0.44 ft.
4. The Upper Rainy Creek and Fleetwood Creek flumes were read.
    a) The URC-02 Flume was read and the gauge height was recorded at 0.38 feet.
    b) The Fleetwood Creek flume was read and the gauge height was recorded at 0.18 feet.
5. The pond above the Fleetwood Creek flume was visited to determine if flows above the pond were greater than flows below the pond.
6. The reservoir level has continued to decline. The gauge reading on the staff gauge in the reservoir was recorded at 0.77 feet.
7. All piezometer's were read and recorded and levels are continuing to decline. An update of the piezometer plots is included in Appendix 3.
8. No bulges, erosion or other anomalies and/or changes were noted to the embankment from the upstream face to the toe.
9. The spillway was not running and the entrance channel was dry.
10. Drains were inspected and the flows in the drains and stream channel below the drains were measured and recorded. Water is still flowing in drain 2 with no detectable change in the rate of flow. Drain flows were all recorded as clear and steady.
11. All weirs and drains were read and recorded, no anomalies were noted. Results are shown in Table 1 below.
12. Gauge height readings from the flumes and weirs in streams and below the toe drains were taken. Results are summarized in Table 1 below.
13. All four (4) transducers onsite were downloaded during the inspection and the transducers were reset. Data will be processed and reviewed. As the Spillway is no longer running that transducer has been removed and will be placed in piezometer A8.
14. Initial personnel and equipment decontamination was conducted at the contamination reduction site with ER pressure washing equipment. Final removal of the inner Tyvek suit and the mask took place at the support trailer.

The readings from all the streams flowing into and out off the site, including the flumes, weirs and reservoir levels are compiled in Table 1 below. Table 2 shows the net difference between inflows and outflows on the day of the inspection.

Table 1: Flow Measurement Results

| Station | GH Reading (ft.)GH Reading iast Month | GH Reading (ft.)GH Reading this Month | GH Reading Difference from last month. | Flow (gpm)/VOL (AF) last Month | Flow (gpm)/ VOL (AF) This Month | Flow/VOL Difference from last month. | Temp °F |
|---|---|---|---|---|---|---|---|
| URC02 | 0.49 | 0.38 | -0.11 | 219 gpm | 131 gpm | -88.0 gpm | 45° F |
| Fleetwood Creek | 0.20 | 0.18 | -0.02 | 25.6 gpm | 20.7 gpm | -4.9 gpm | 43°F |
| Reservoir | 1.37 | 0.77 | -0.60 | 33.21 AF | 22.60 AF | -10.61 AF | 49°F |
| F 1-2-3-4 | 0.25 | 0.15 | -0.10 | 40.4 gpm | 14.5 gpm | -25.9 gpm | |
| W 5 | 0.146 | 0.125 | -0.021 | 9.46 gpm | 6.43 gpm | -3.03 gpm | |
| D6 | 0.849 | 0.948 | -0.099 | 294 gpm | 102 gpm | -192 gpm | |
| F 7-8 | 0.10 | 0.11 | +0.01 | 4.53 gpm | 5.48 gpm | +0.95 gpm | |
| W 12 | 0.333 | 0.26 | -0.073 | 73.1 gpm | 39.6 gpm | -33.5 gpm | |
| F -Seep | 0.21 | 0.15 | -0.06 | 28.3 gpm | 22.7 gpm | -5.6 gpm | |
| LRC01 | 0.30 | 0.22 | -0.08 | 684 gpm | 450 gpm | -234 gpm | |
| CC02 | 0.14 | 0.15 | +0.01 | 67.32 gpm | 76.3 gpm | +8.97 gpm | 42°F |
| LRC02 | 0.58 | 0.44 | -0.14 | 783 gpm | 497 gpm | -286 gpm | 45°F |
| LRC06 | 0.65 | 0.55 | -0.10 | 909 gpm | 702 gpm | -207 gpm | |
| Spillway | 0.00 | 0.00 | 0.00 | 0 gpm | 0 gpm | O gpm | |

Table 2: Total Flows

| Total Flows | |
|---|---|
| Inflows Above Reservoir at URC02 and Fleetwood Creek | 152 gpm |
| Outflow Below Reservoir above CC02 | 450 gpm |
| Difference (Out flows greater than inflows) | +298 gpm |

## 3.0 DISCUSSION

### 3.1 Weather Updates

The precipitation in this area as of September 29th, 2011 is reported as 133% of normal at the Banfield Mountain recording site which is located just northwest of the project, indicating the water year, beginning October 1, 2010, in the vicinity of the project is still above normal. The entire Kootenai basin shows precipitation levels at 120% of normal.

The temperatures in the past month have ranged from a low of 32°F to a high of 91°F and there has been 1.0 inches of precipitation since the August inspection.

The water year ended on September 30th, the day after the inspection with a total of 51.3 inches of precipitation at the Banfield Mountain recording site and 133% of normal precipitation. The 2010-2011 water year was the wettest year since 2008 and is the wettest year in the last 14 years (since 1997). Normal precipitation is estimated at 38.5 inches in this area based on NRCS records from 1971-2000.

## 3.2 Site Access

Jeremy Peterson was the onsite health and safety, equipment and personnel safety officer and arranged for site access prior to the site visit. Jeremy was the means of transportation while Mr. Hafferman and Mr. Nelson carried out the inspection. ER continues operations on the site and the inspection crew checked in at the entrance shack per EPA requirements. As required for safety, large trucks were followed on haul roads.

Access to the site was obtained with the Ranger ATV. The ATV sustained a flat tire midway through the inspection. It was decided that the remainder of the inspection, from the crest to the toe of the dam would be completed by Kurt and Dan on foot and they would walk to the decontamination area while Jeremy took the ATV to the decontamination area and retrieved the truck. Both Kurt and Dan have maintained a healthily life style and have recently committed to keeping in shape and work out weekly; mainly because of the physical requirements of this job and in particular in the winter. This mishap is a prime example of why BHI and Chapman maintain a regular safety program that includes worker health. This is a remote location and may require that workers be able to walk, sometimes in the snow, from the top of the mine site to Highway 2, a distance of 7.5 miles. A spare tire will be recommended to Chapman in the future as standard equipment when using the ATV.

## 3.3 Fleetwood Creek Pond and Upper Reservoir

BHI has noted that groundwater flows from KDID drains are higher than surface water volumes and BHI is looking for sources of groundwater infiltration at the valley margins, and in particular, at inflection points in the local topography. As part of this inspection, BHI visited the small pond above the Fleetwood Creek flume to check for diminishing flows that would indicate water was infiltrating into the ground before it reached the reservoir.

The site inspection showed that Fleetwood Creek has been re-routed to bypass the pond and water from the creek appears to only flow toward the pond under high flow conditions; therefore upstream and downstream flows were unchanged and the pond is not a source of groundwater infiltration, at least at low flows. It appears that the pond acts as a low spot collecting excess stream flow, rain runoff and snowmelt. The pond shows evidence of high and low water so the water must infiltrate into the ground or evaporate in order to leave the pond but it is not a definitive source of water infiltration.

Fleetwood Creek was followed until it enters Rainy Creek to determine if there was a section of stream where the stream flowed underground. What was found was that the stream enters the upper reservoir and flows, without significant loss of flows. Therefore all surface water from Fleetwood Creek appears to enter the upper reservoir.

## 3.4 Surface Water Flows

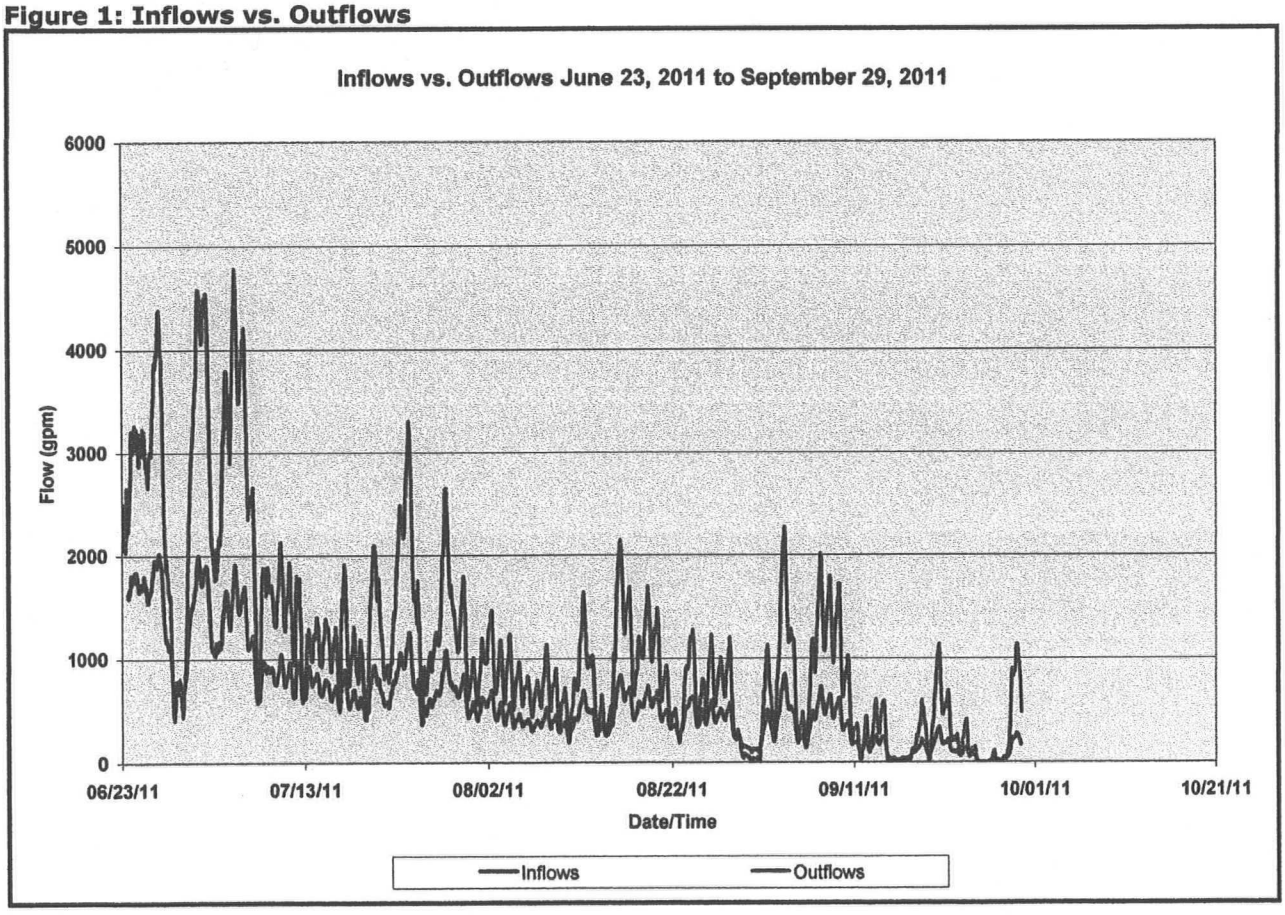
Inflows into the reservoir show a continued decline through the summer season in conjunction with drying conditions. The inflow from Upper Rainy Creek was recorded at 131 gpm and Fleetwood Creek was recorded at 21 gpm for a total reservoir inflow

of 152 gpm on September 29th. Inflows show a 38% reduction over the flows measured in August. Inflow volume over the past month was measured at 18.8 AF and outflow volume at LRC-01 measured 39.6 AF; 21 AF more water flowed out of the drains than flowed into the reservoir.

The transducer data downloaded this month did not match up to previous month's data over the season cycle and required values to be averaged to make the data fit. No sudden data shift or data reading error could be found to adjust the data and it is assumed at this time that a new calibration on the transducers may be needed as the reading shift appears to be gradual. Therefore volume values used this month are informational only and no concise conclusions can or should be drawn from them at this point.

Reservoir outflows into Lower Rainy Creek have gone from 684 gpm in August to 450 gpm during this inspection, a drop of 34%. The spillway has not been noted as flowing Since July 28th, so all flows are routing through the toe drains or the foundation gravels as they move through the impoundment area. Figure 1 below compares surface water inflows and outflows since June 23rd.

**Figure 1: Inflows vs. Outflows**

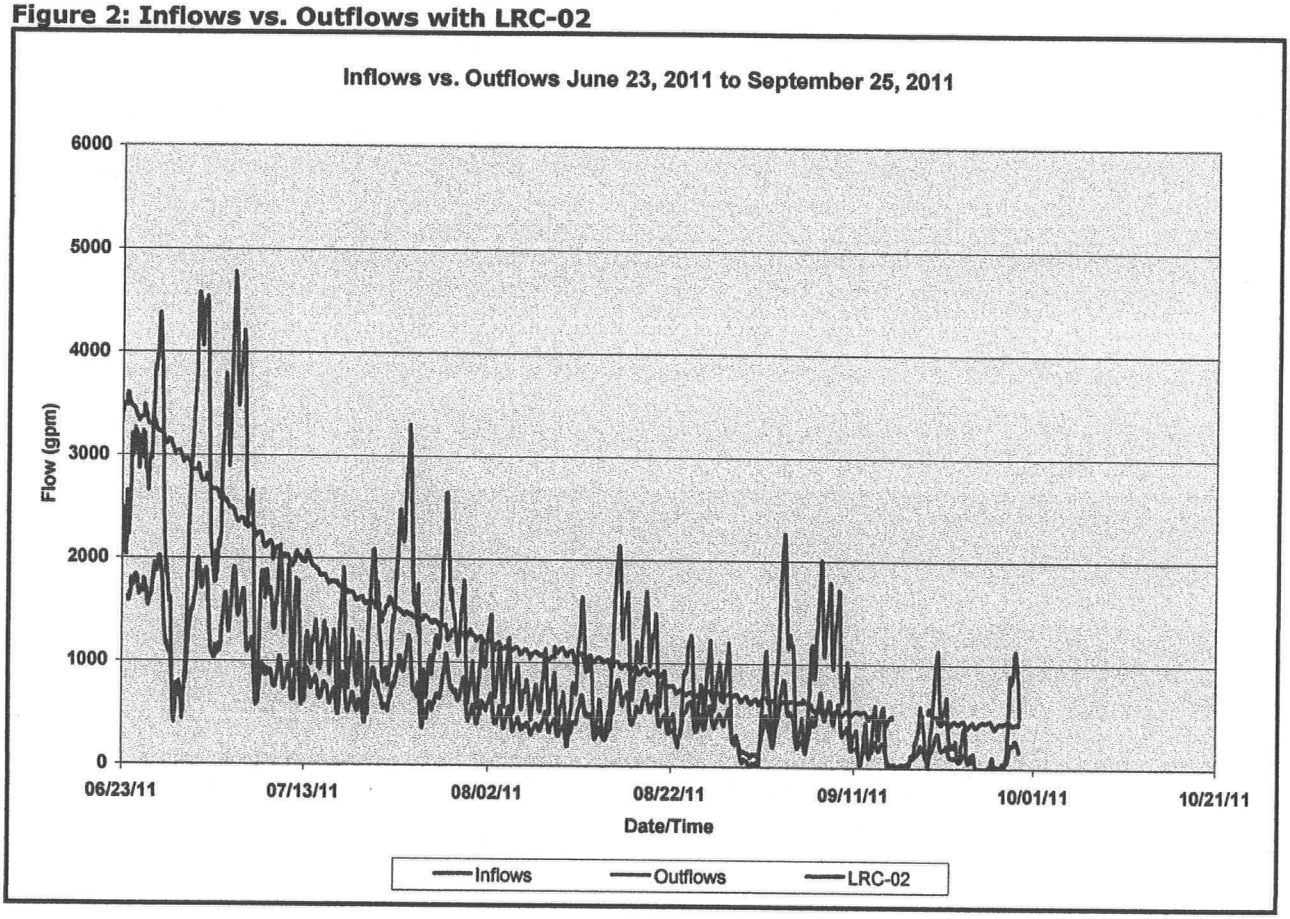



In the graph above, we can see that outflows have been consistently higher than inflows. Inflows include Upper Rainy Creek and calculated Fleetwood Creek flows and outflows include toe drain and spillway flow below the toe of the dam. Of particular interest are the continued matching flow patterns above and below the impoundment. As previously mentioned, there is not a calculatable lag time between

inflow and outflow responses with the current 30 minute interval transducer readings.

This correlation is unexpected and will be monitored more closely in the coming months. To calculate a lag time, the transducers will be set to record at faster intervals during the next inspection to see if a delay in flow changes can be measured. Figure 2 below shows the inflows and outflows along with the flows recorded at LRC-02 below the mill pond.

**Figure 2: Inflows vs. Outflows with LRC-02**




As previously discussed, the graph above is the same as Figure 1 except it includes the flow data obtained from MWH Global for the LRC-02 flume which sits below the mill pond. LRC-02 is measuring the same water as LRC-01 except for the addition of groundwater discharges and Carney Creek, which was removed in the graph above.

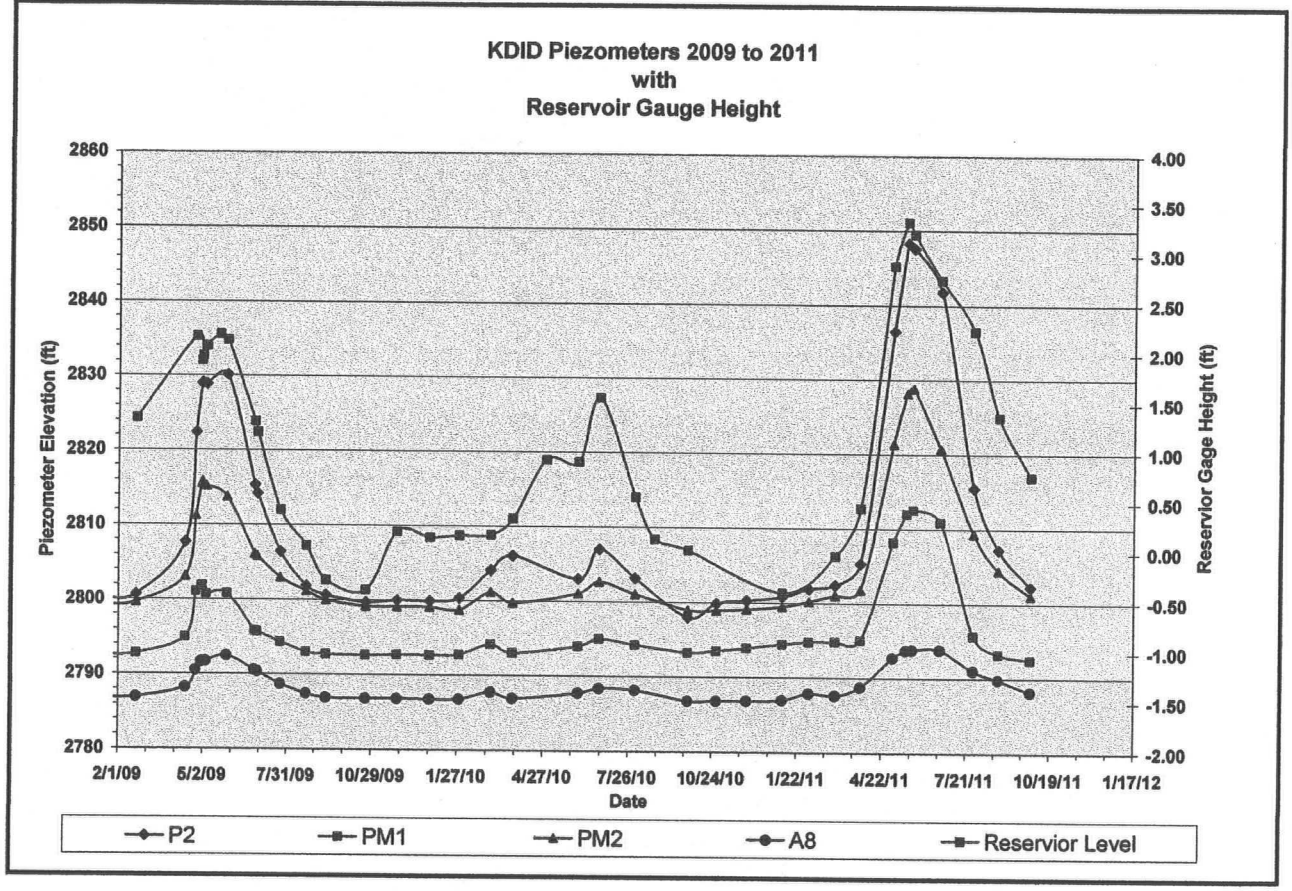
As can be seen, both the outflows at LRC-01 and LRC-02 are consistently higher that the inflows at URC-02, providing a second means to verify that outflow volumes are higher than stream inflows.

## 3.5 Reservoir

As with surface water flows, the reservoir level has continued to decline over the past month and was reading 0.77 feet and the water level was approximately 400 feet from the upstream crest of the dam on the date of this inspection. The reservoir is

still approximately 0.7 feet higher than normal for this time of year. Figure 3 below shows the updated reservoir level vs. piezometers.

**Figure 3: Reservoir vs. Piezometers**




As shown above all piezometer levels are continuing to decline with falling reservoir and inflow levels; as is typical for this time of year. The transition to seasonally low levels continues to be near 1 month behind typical values measured and recorded onsite.

## 3.6 Spillway

The principal spillway was not been visually recorded as running since July 28th and ran for a total of 108 days this spring. Calculated flows estimate that from May 25th to July 28th, a total of 236AF of water went over the spillway for an average flow of 500 gpm over the spillway this spring. To BHI knowledge, this is the longest the spillway has ever run.

## 3.7 Drains and Drain Flows

Toe drains continue to show declining flows through and under the impoundment. All flows were noted as clear and steady with no visible transport of sediment in the drain water. Root wads were noted in a few of the drains, were cleaned out on site, and do not appear to pose an immediate threat to drain flows.

Flows in drain 1 have ceased for the season. Drain 2 is still running with a decline in flows over last month to less than 1 gpm. It is feasible that drain 2 will cease flows by next month's inspection. Of significance is the black globs of sediment that has been noted at the outlet of the drain and was visibly running in the pipe on August 23rd when a video inspection was carried out on the site. While no continued visual movement has occurred, we continue to see the same deposits at the end of the pipe that indicate this transport may still be intermittently occurring.

Drains 3 and 4 decreased flow again this month. Flows appear to be normal for the time of year and no new material transport has been noted.

Drain 5 is still sustaining higher flows than normal at this time and, based on data this year, has possibly increased capacity. Drain 5 has also shown signs of sediment transport and the area upstream of the weir 5 has fliled in. It may be that flushing the pipe of sediment has resulted in an increase in flow capacity in drain 5. While drain 5 flows are small in comparison to other drains, its reaction to this years high flow has been interesting and will be monitored.

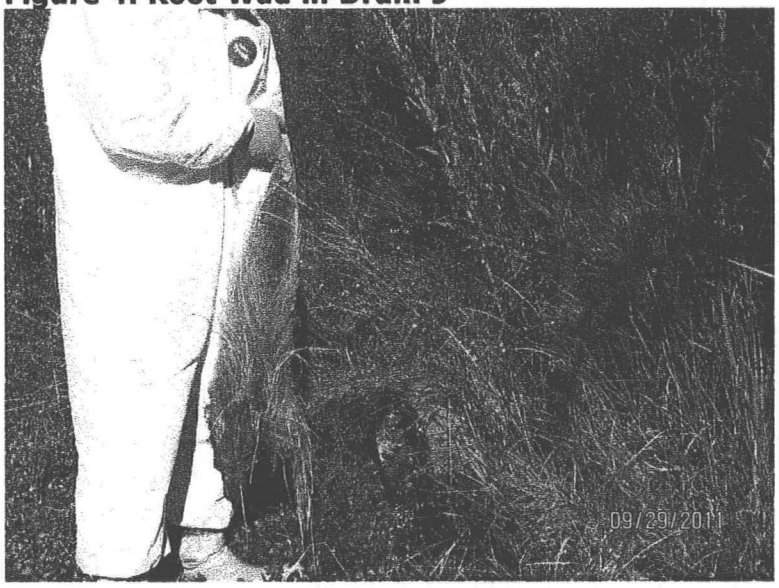
Drain 6 was recorded at 102 gpm down from 294 gpm on August 25th, a reduction of 65%. This flow is normal for the time of year but is low when compared to the flows occurring at other drains in the system. Drain 6 flows typically account for 67.5% of all surface water inflows and this month only accounted for 23% of the total flow. It may be that drain 6 had the opposite affect as drain 5; the higher flows may have reduced capacity. This trend will be closely monitored.

BHI has recently had conversations with two former W.R. Grace mine personnel and Libby residents, Dan Youso and Mike Munro in regards to the drain 6 steel pipe. Kurt went to high school with both Mike and Dan and used the personal connection too attempt to get a reliable interview from people that were actually on site during the original KDID construction. Both Mike and Dan stated that they worked on the original construction of the embankment starter dam in the mid 1970's. Both Dan and Mike were interviewed independently and both stated that they were young at the time and their recollection is vague but to the best of their knowledge, the pipe that feeds drain 6 runs well out into the reservoir and may even reach to the upper impoundment. Mike remembered that he had spent a considerable amount of time bedding a large steel pipe. Dan's stated that he mainly pushed dirt toward the track hoes bedding the pipe and he felt that the work he did was mainly in the starter dam. Neither remembered seeing gravel cross drains and neither recognized the Phase 1 plan view or cross section. This is typical of research that BHI has conducted; the people have either passed away, have moved and can't be reached or just do not remember as it was over 30 years ago. BHI has speculated in recent months that lacking any other persons, attempting to find persons that can describe the concise locations well enough that it could be documented on a plan set is a futile effort.

Flow has ceased in drain 7 but seepage below the pipe continues and appears as clear and steady. Drain 8 also is flowing clear and steady. The gauge height on the flume 7-8 showed a surprising 0.01 foot increase over last month when most drain flows on the project show a decline in flows. Drain 8 shows some sign of fine grained black sediment transport which shows up in flume 7-8. The flume was cleaned and will be monitored for sediment transport next month.

Drain 9 shows lower flows than last month and correlates to the decreasing inflows on the project. A root wad was pulled from the pipe and is shown in figure 4 below. No sediment was noted as being trapped behind the root wad and no change in flow was noted.

**Figure 4: Root Wad in Drain 9**




Drain 10 and 11 are at normal flows for this time of year and no anomalies were noted.

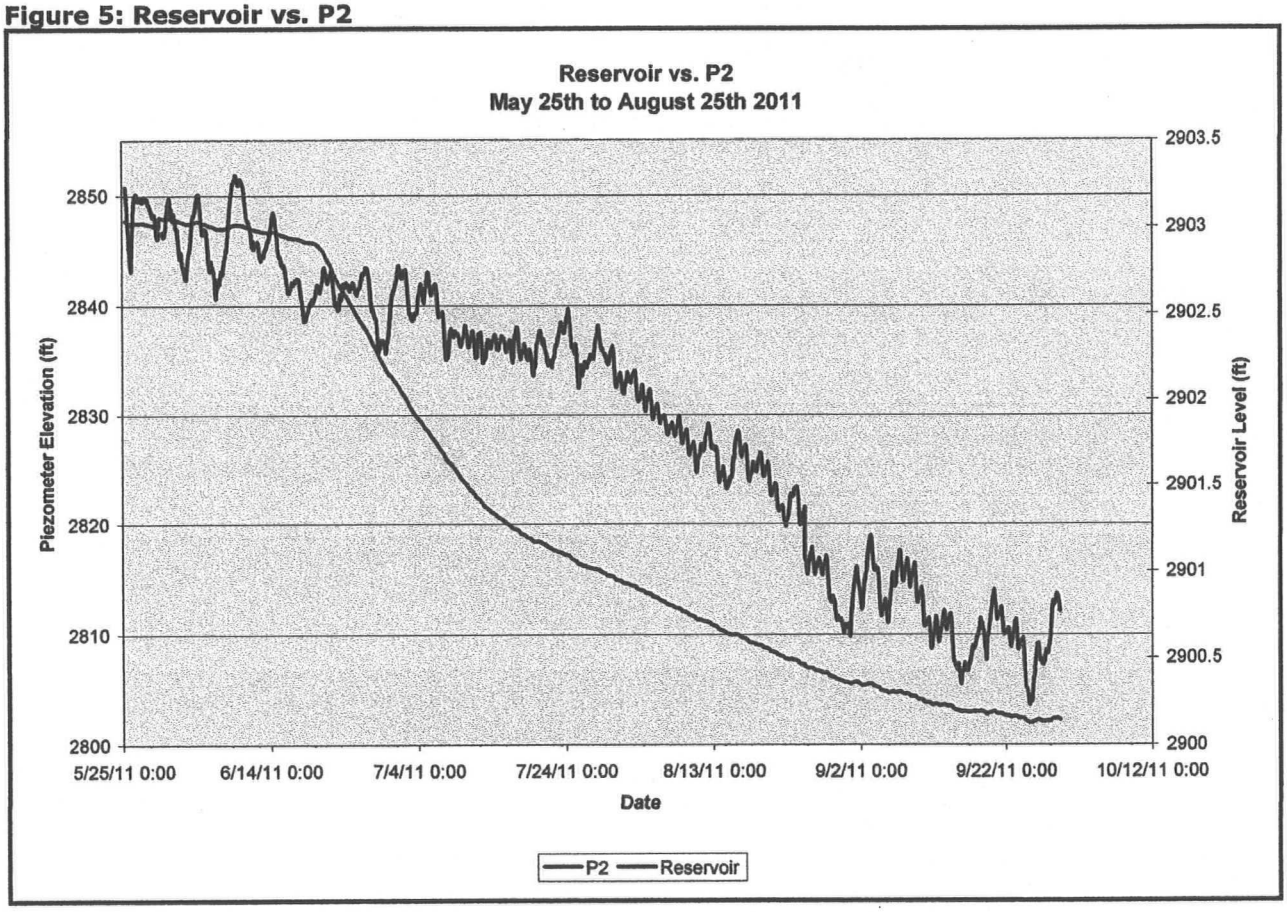
Drain 12 has also reduced flows and a small root wad was removed during the inspection. Review of past data shows that drain 12 flows are nearly double those recorded last year. Monthly inspections are still indicating some gravel and fine grained sediment material is being transported but not in the quantities noted this spring. Review of 2010 video footage showed that drain 12 was previously videoed to end in a pile of loose rock and sediment that would be subject to transport if water reached the level of the end of the drain. We therefore suspect that the terminal end of the pipe is the source for the material transport noted in drain 12 this year.

3.8 Piezometers

Piezometer readings have continued their decline and continue to stabilize near normal levels. Based on precipitation observations, the water and piezometer levels experienced this year should be expected at a nearly annual basis when normal moisture levels are present. These conditions were last encountered in 2008 when near normal precipitation levels were recorded at the Banfield Mountain site. However the phreatic water surface reaction seen this year was more extreme than in 2008. It is not known if the rapid rise and fall is linked to the higher flows or the changes noted in the drain system; i.e. gravel and sediment transport and changes in drain 6 capacity. The piezometers are to continue to be monitored for any indication of changing conditions in the reservoir and or embankment itself.

The Piezometer P2 transducer was downloaded during this inspection along with the other transducers and plotted against the reservoir to check for adverse changes or correlations. Figure 5 below shows this graph.

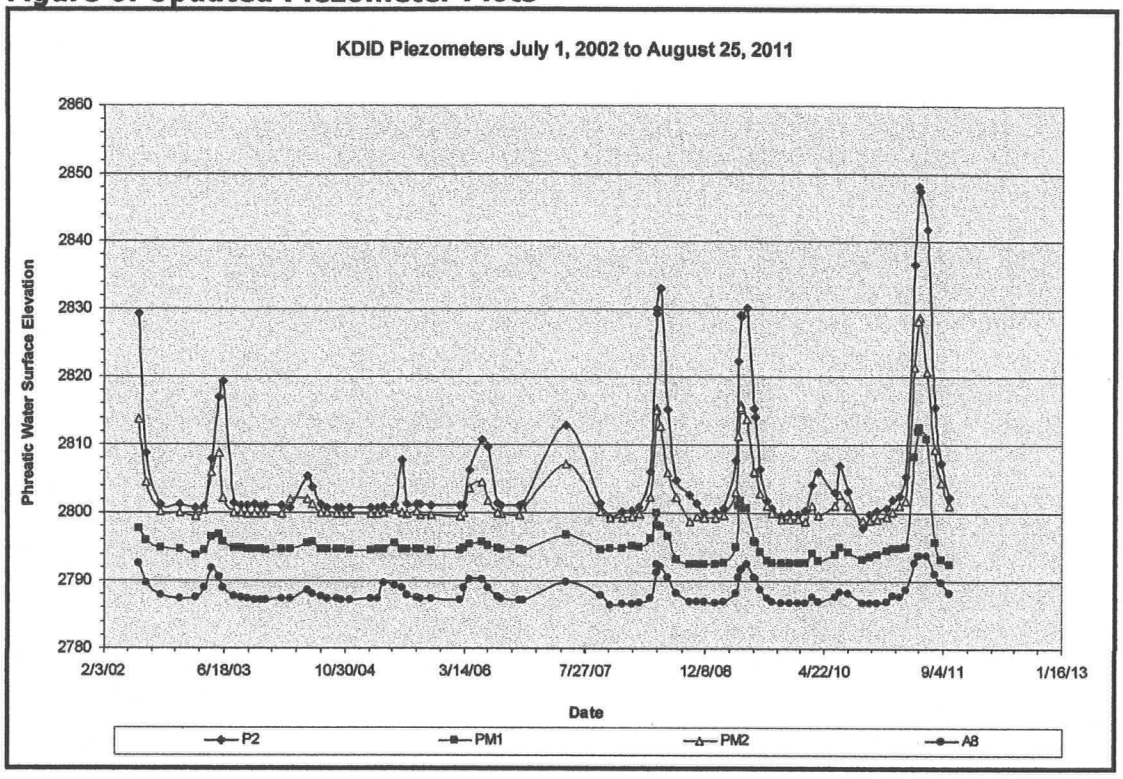
**Figure 5: Reservoir vs. P2**




The graph above shows the continued decline of piezometer P2 and the reservoir. P2 showed no abnormal spikes or changes and as shown above is nearing typical low phreatic water surface levels. The piezometer has risen and dropped over 40 feet since peak levels were measured on May 18th this spring.

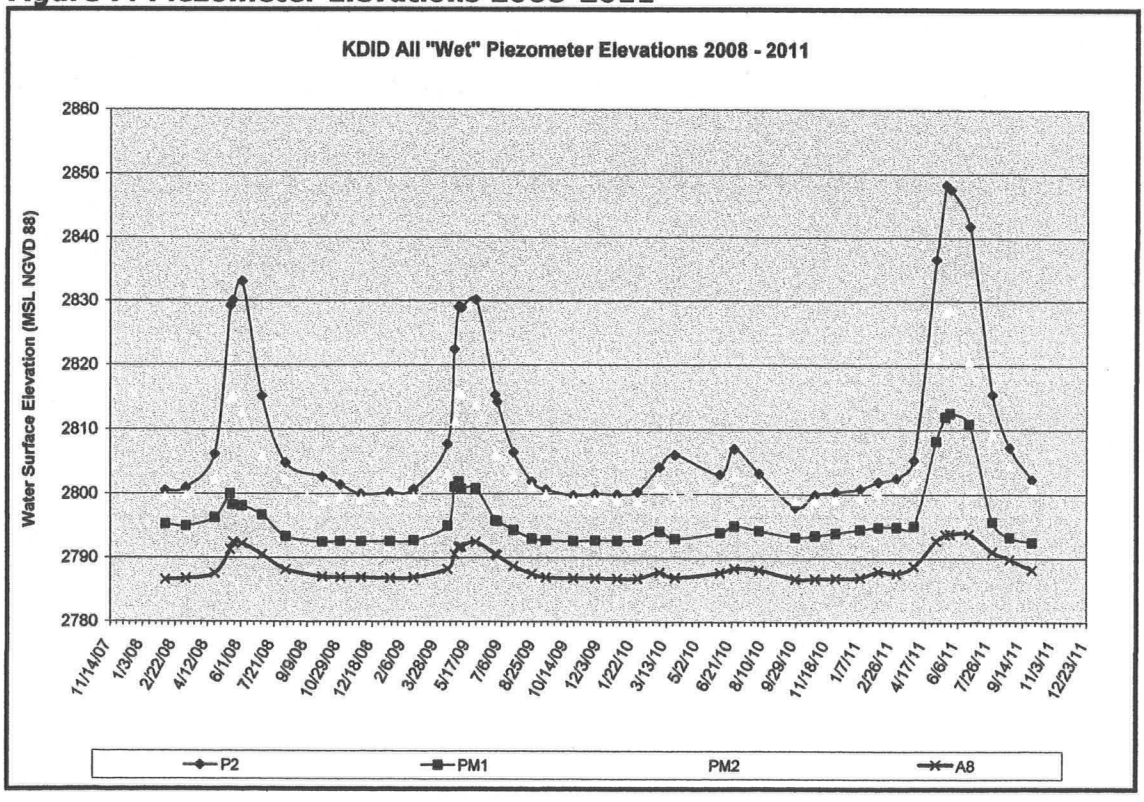
The updated piezometer plots from 2002 to the date of this inspection are shown in Figure 6 below.

**Figure 6: Updated Piezometer Plots**



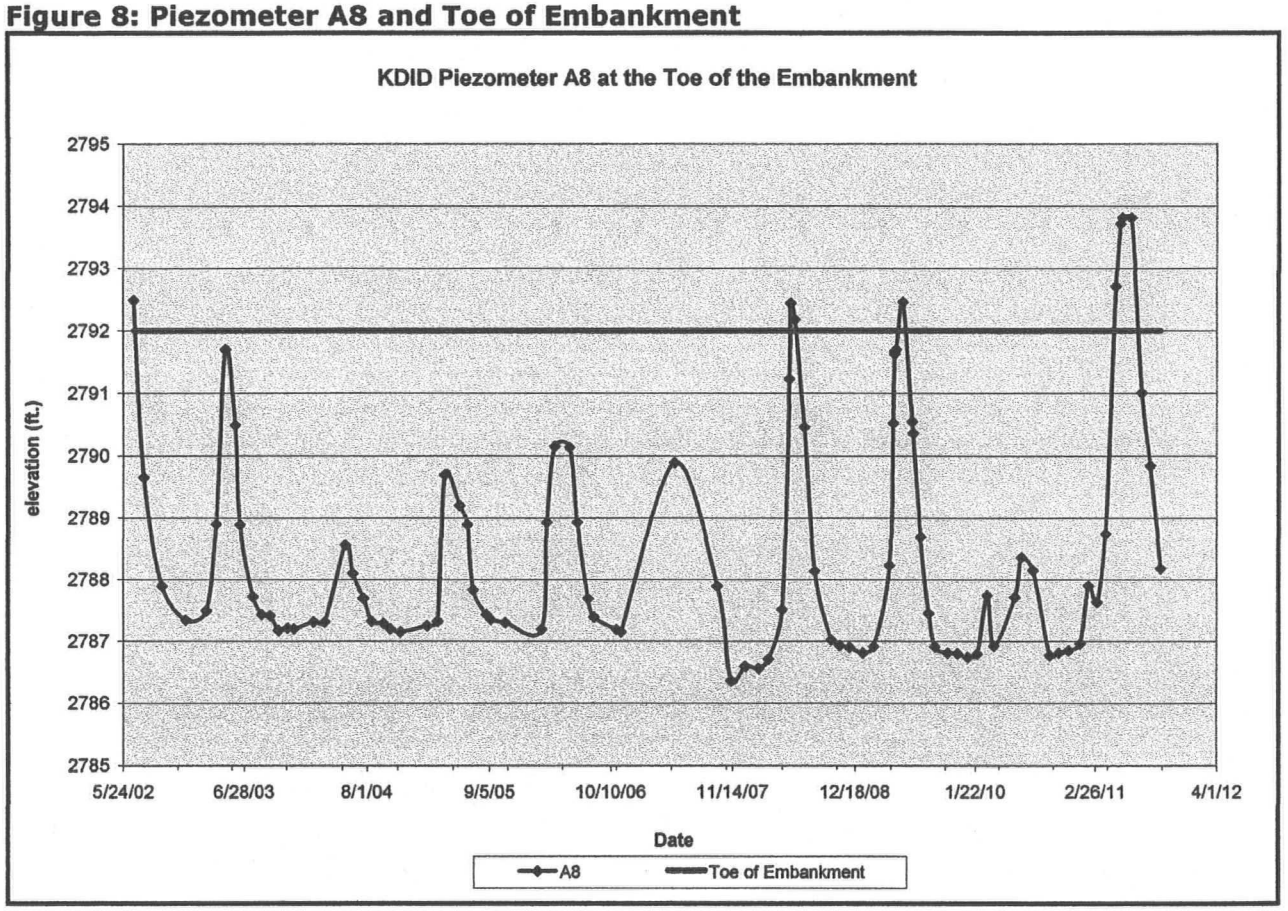

The graph above shows the highest recorded levels and well as the return to normalized levels and the annual cyclic changes that occur on the project. Figure 7 below shows the same piezometers, but over a shorter period of time.

**Figure 7: Piezometer Elevations 2008-2011**



The graph above represents data collected since BHI began onsite inspections. We can see that piezometer A8 is dropping slower than the other piezometers on the site and shows the higher than normal phreatic water surface at the toe of the dam. Water levels this year at A8 have fallen slower than past years and indicate the volume of groundwater still present and moving below the dam. Figure 8 below shows the flat sustained peak in piezometer A8 at the toe of the dam that is not typical.

**Figure 8: Piezometer A8 and Toe of Embankment**




## 4.0 HAZWOPER UPDATES

BHI continues to conduct safety meetings at the beginning of each inspection. All personnel have current certifications, equipment is maintained in good working condition and we have no personnel issues at this time.

The ATV and all equipment are washed with pressure washing equipment supplied by ER. Decontamination will be conducted with their equipment and water until operations are discontinued in the fall. The equipment decontamination was completed successfully without malfunction, outer Tyvek suits were removed at the contamination reduction area. Personnel then proceeded to the support trailer to complete the decontamination and depart.

## 5.0 CONCLUSION

No anomalies in the alignment of the dam were noted. No bulges, surface erosion or other physical sign of failure were noted on the site. The principal spillway and emergency spillways are clear with no obstructions and the concrete is in good to excellent condition.

Generally all flow and phreatic water surface readings recorded this month are lagging about 1 month behind, that is to say they are higher than normal levels, when compared to past readings on the site.

Outflows at the toe of the dam continue to be greater than inflows. Surface water inflows accounted for only 36% of the total outflows on the date of this inspection and were calculated from the data to be 47% of the outflow volume over the past month. This month surface water inflows totaled 18.8 AF while outflows totaled 39.6 AF. The reservoir level dropped roughly 10.6 AF therefore the net outflow was 10.2 AF more than surface water inflows. The average inflow into the impoundment was 121 gpm and the average outflow through the toe drains at LRC-01 was 256 gpm. The average flow attributed to reservoir level depletion over the last month was 69 gpm. Based on the above values groundwater flow rates over the past month accounted for 26% of the outflows and, as discussed above and in the July and August reports, indicates that groundwater flow into the drain system is a significant portion of the total outflow. It is noted that the contribution of groundwater is subsiding and the net difference between the two is getting smaller but there is still a net increase in the volume of flow at the toe of the dam.

Since transducer installation at URC-02 on June 23rd to the date of this inspection inflows have totaled 208 AF and outflows at LRC-01, including the measured spillway flows have totaled 454 AF. Reservoir volume drop over the same period was 41 AF. Therefore the net surface flow including reservoir level change is 249 AF and outflows at 454 AF were 1.82 times greater than surface water inflows. Therefore groundwater flows accounted for 45% of the total outflows through the drains over this monitoring season.

As discussed in previous reports, transducer data above and below the reservoir show that inflows and outflows are in some way immediately and directly connected, because there is no measurable lag time between upstream flow fluctuations and downstream flow fluctuations within the 30 minute transducer interval readings. The flumes are 4,500 feet apart, so for a fluctuation time less than 30 minutes the water flow rate is still calculated to be greater than 2.5 feet/second between the flumes. As previously stated, this flow rate is only capable in open channels, open pipes, and in very pervious and cavernous groundwater conditions and is not feasible as an infiltration rate through the tailings. BHI continues to suspect that there is an open pipe in the reservoir that is tying inflows to outflows.

## RECOMMENDATIONS

No new recommendations at this time. Recommendations from past reports are included below.

1. Investigate Pond Area: The rapid draining of the pond west of the access road should be investigated to determine first, why it occurred and second, what the repercussions of this event have on the long-term stability of the dam. Questions to be answered during this investigation are; where the intake structure is for the previously discussed Phase 5 decant tower and is it affecting the pond elevation and are there other sources feeding the pond and how are they related to fluctuation in the reservoir level.

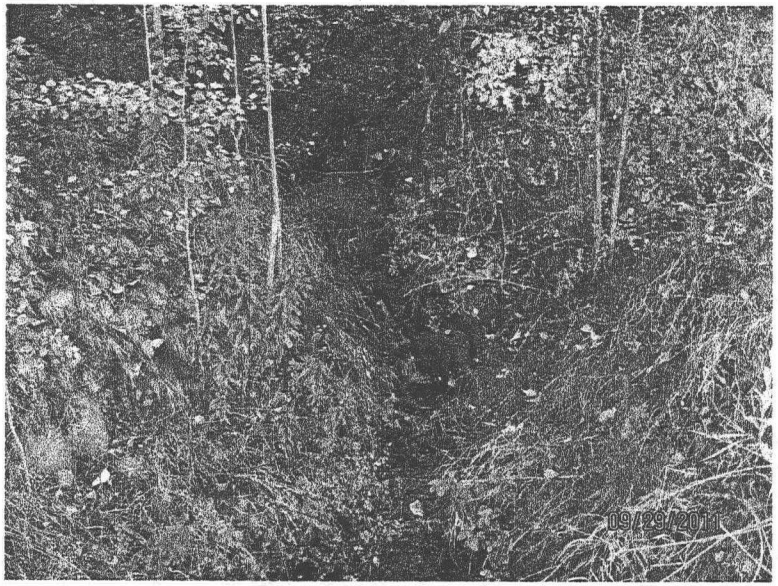
2. Drain Flows and Piezometers: Continued monitoring of all previously established monitoring devices throughout the site in order to identify relationships in water level fluctuation and their potential impact on the dam. Continue to monitor sediment transport below the drains that appear to be actively moving gravel and sediment.

3. Investigate Groundwater: The recent findings that show roughly 50% of drain flow is groundwater should be investigated. The characteristics of this groundwater aquifer below the dam and above it should be determined. This investigation would include a drilling program at the toe and crest of the dam as well as upstream of the impoundment to determine its limits and how it interacts with the dam and surface water flows. Cased holes should be left at select drilling locations to allow aquifer testing.

4. Winter Decontamination: It is recommended that with the upcoming cold weather that related personnel, equipment and decontamination protocol is established by BHI and Chapman Construction to provide documented and acceptable procedures for the different conditions and limitations encountered on the site. In addition it is recommended that all personnel that are to be on site during the winter are capable of sustained physical exertion for at least three hours and they are capable of self rescue at all times.

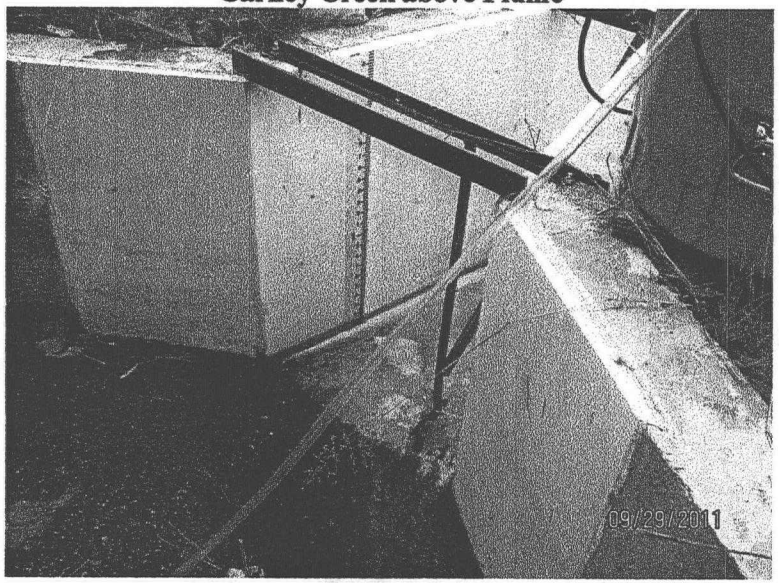
## APPENDIX 1

## SITE PHOTOGRAPHS




**Carney Creek above Flume**


**CC-02 Gauge Height**



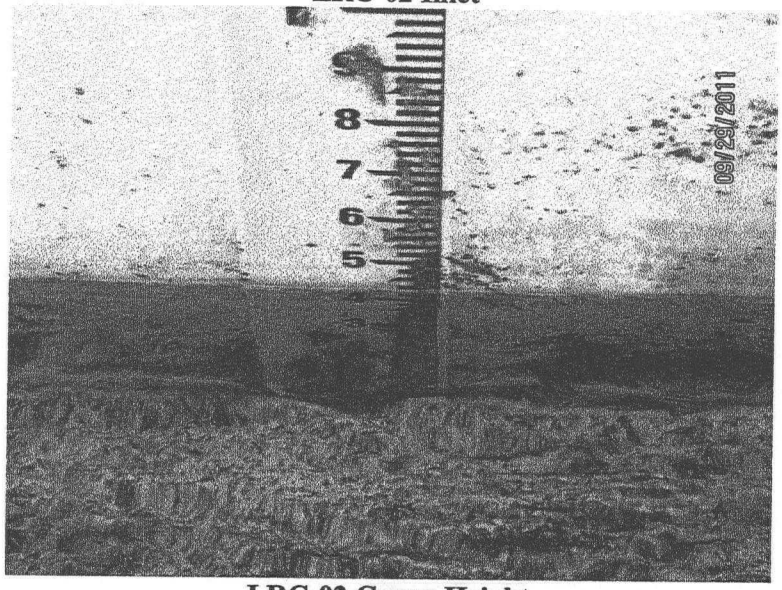

**CC-02 Inlet**


**CC-02 Outlet**

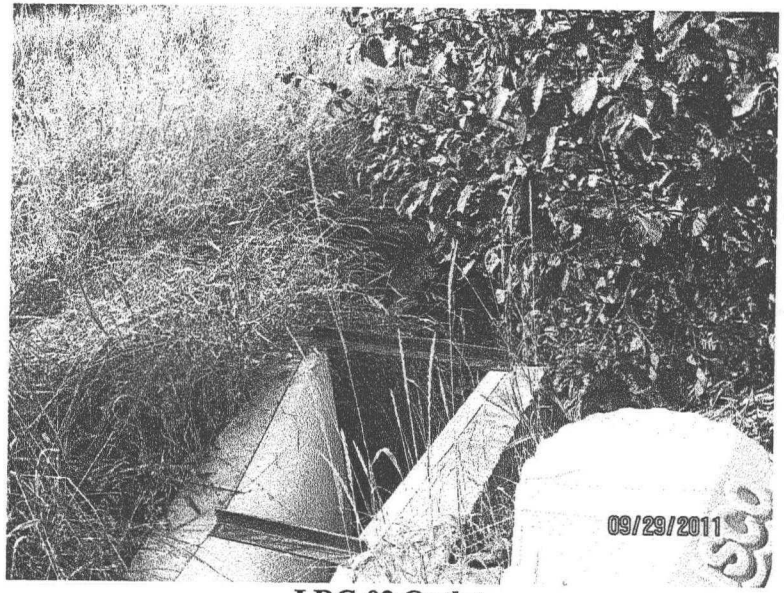

**CC-02 ISCO Reading**


**LRC-02 Inlet**

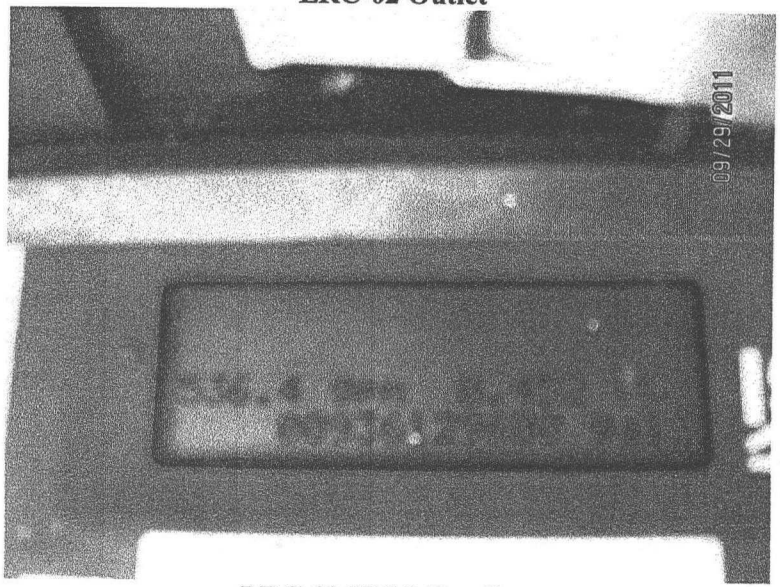

**LRC-02**




**LRC-02 Gauge Height**

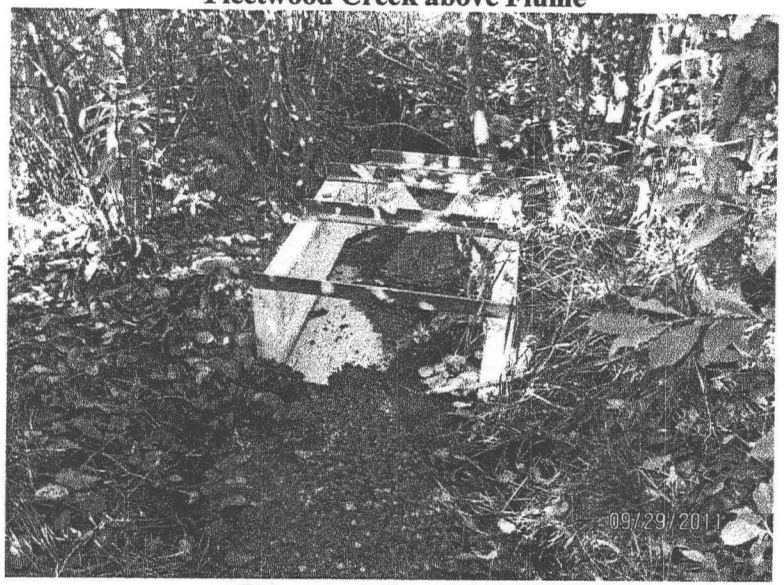



**LRC-02 Outlet**

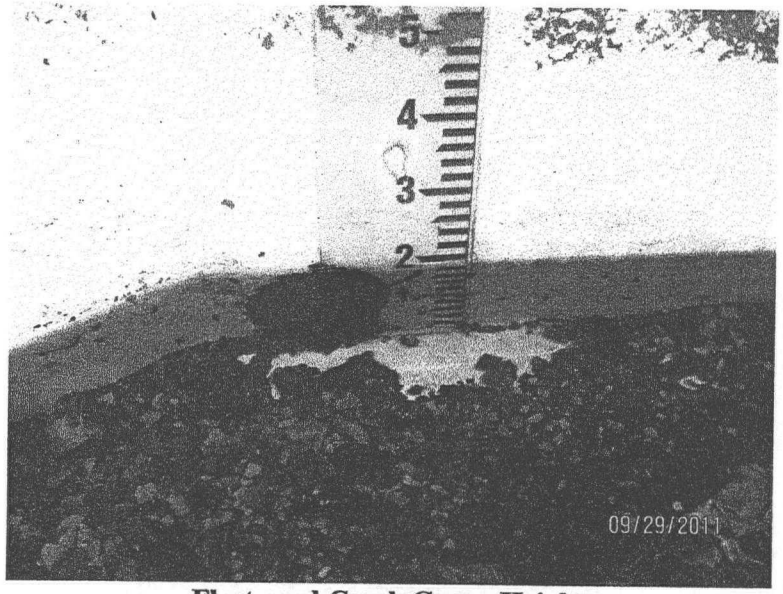



**LRC-02 ISCO Reading**

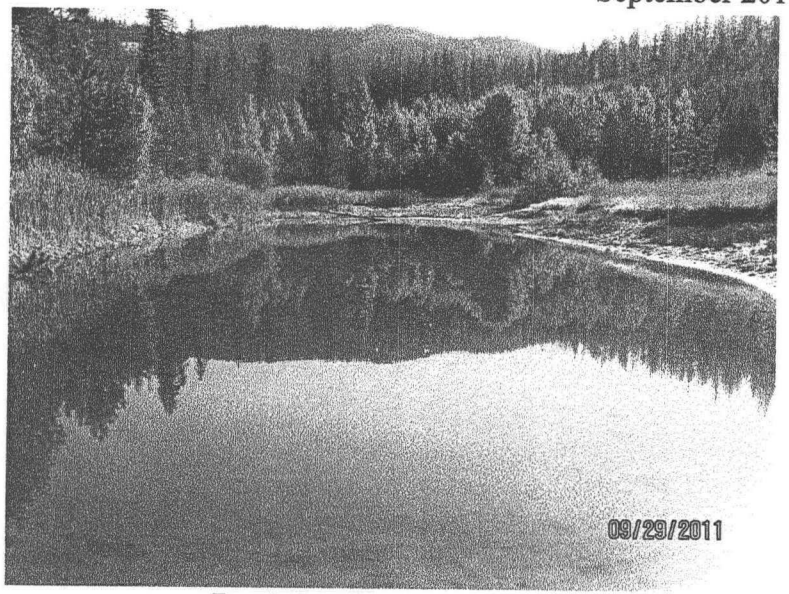

**Fleetwood Creek above Flume**



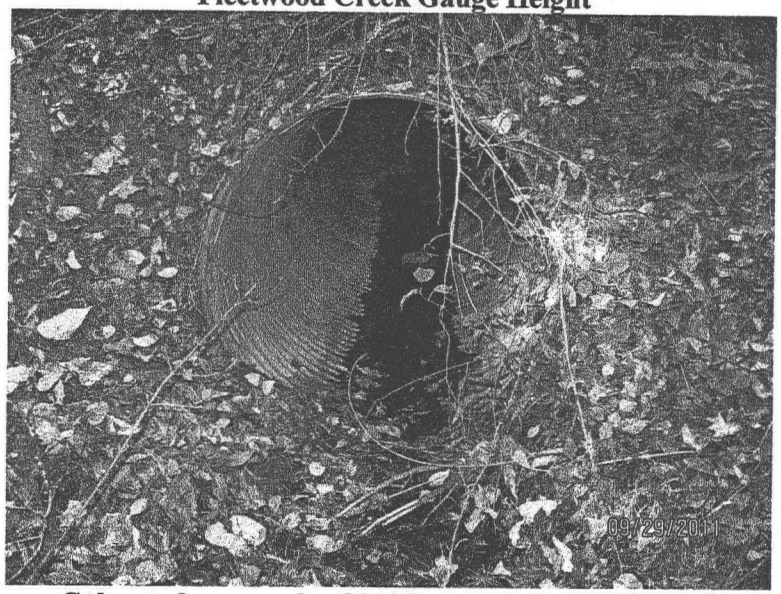

**Fleetwood Creek Flume**



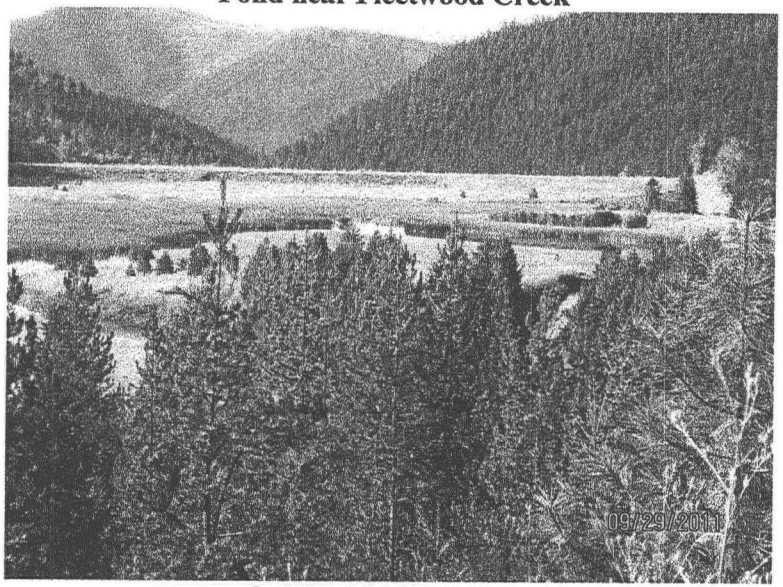

**Fleetwood Creek Gauge Height**




**Pond near Fleetwood Creek**

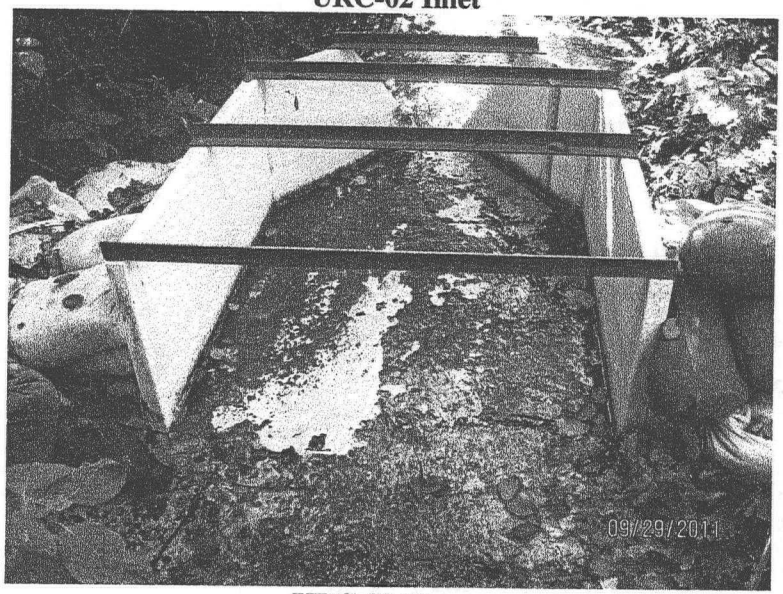



**Culvert above pond – Old Fleetwood Creek Channel**

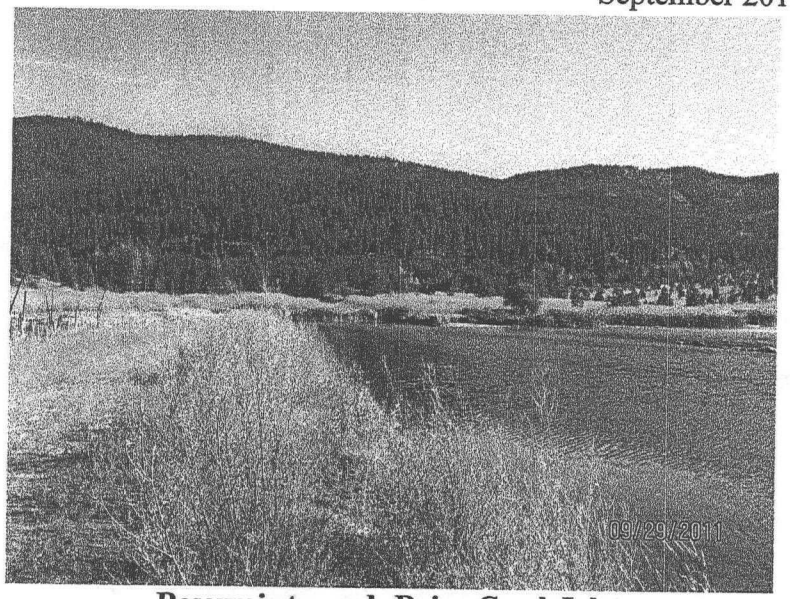



**Overlooking Reservoir**

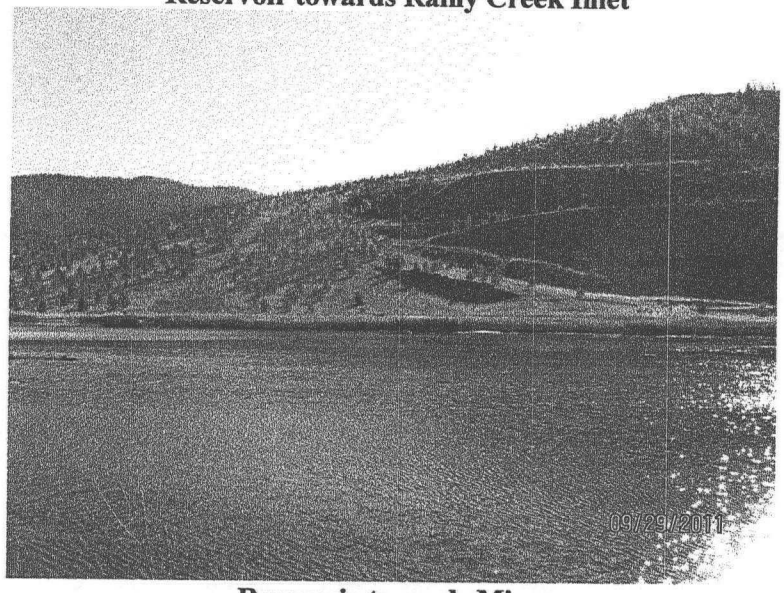

**URC-02 Inlet**



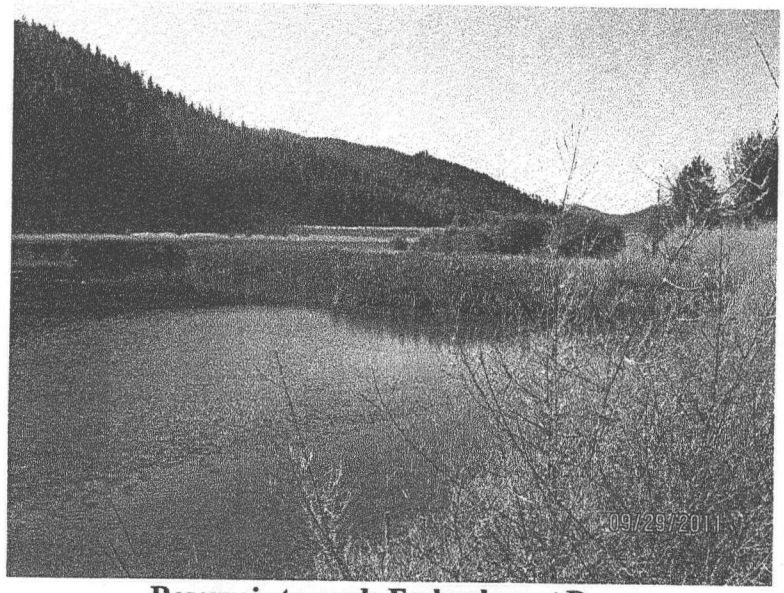

**URC-02 Flume**



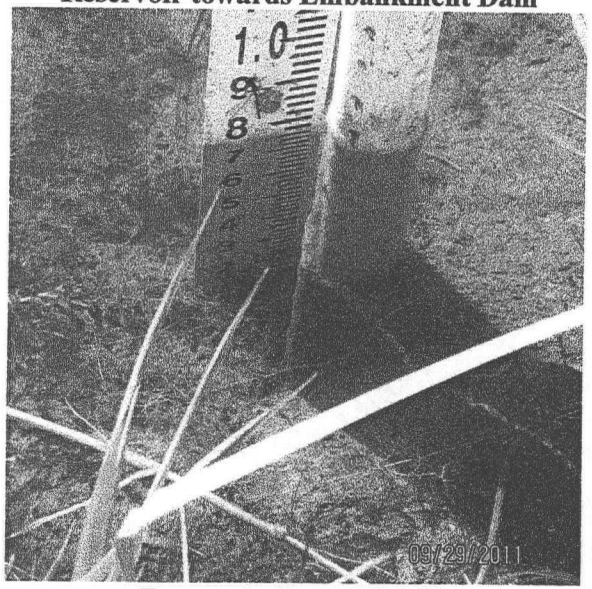

**Reservoir towards Rainy Creek Inlet**



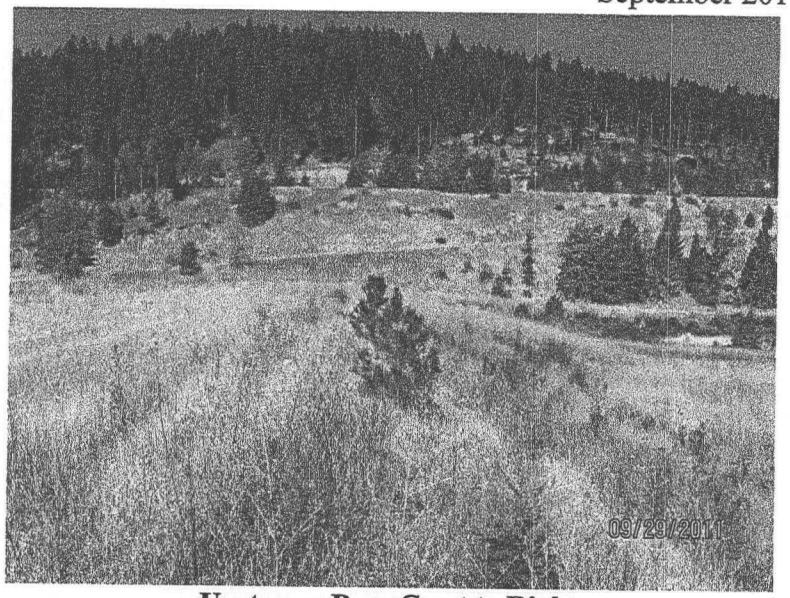

**Reservoir towards Mine**



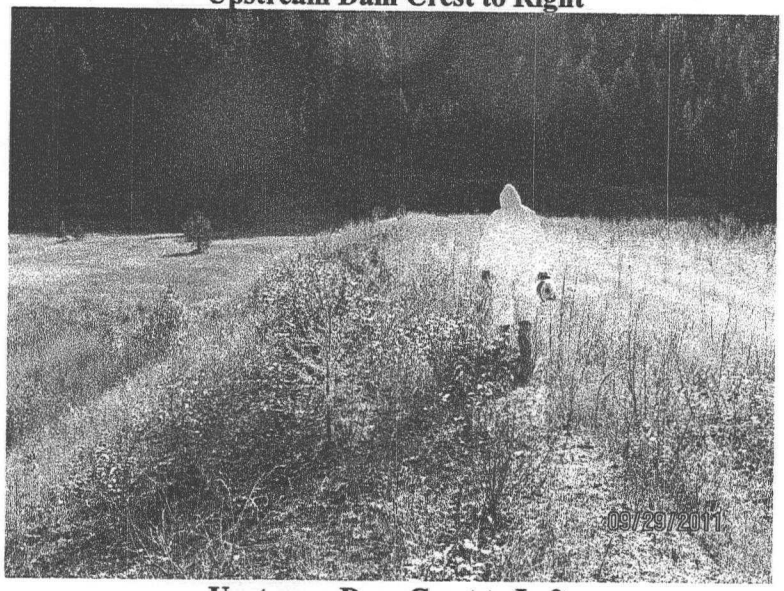

**Reservoir towards Embankment Dam**



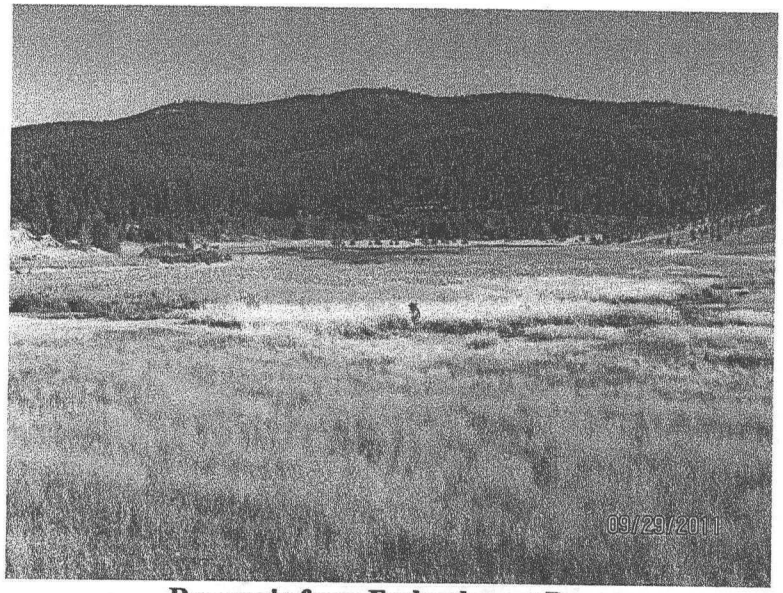

**Reservoir Gauge Height**




**Upstream Dam Crest to Right**

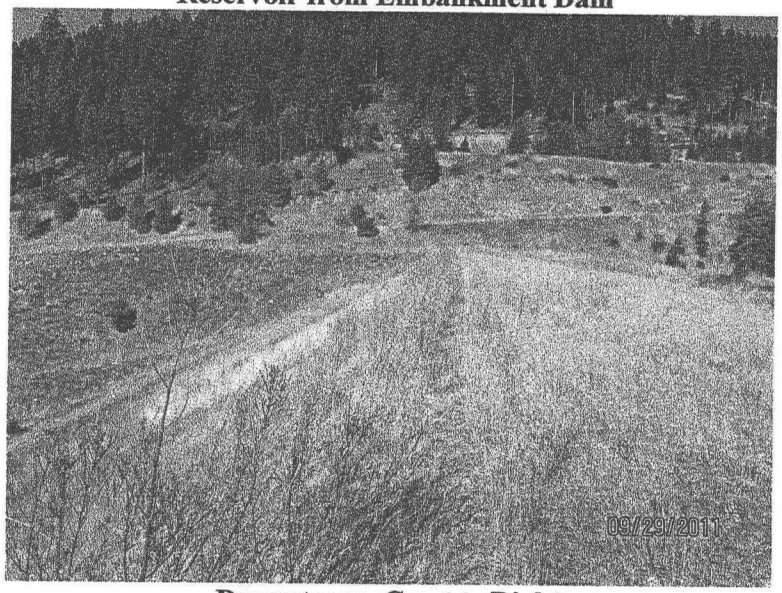



**Upstream Dam Crest to Left**

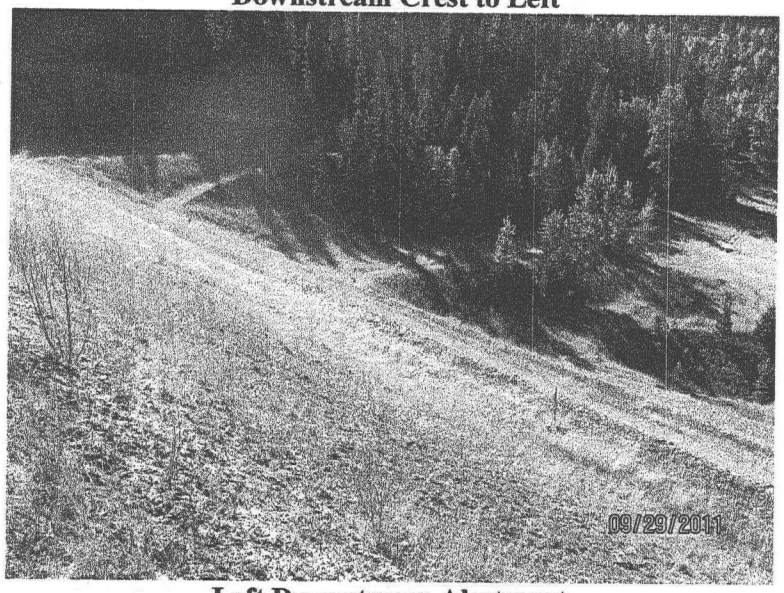



**Reservoir from Embankment Dam**

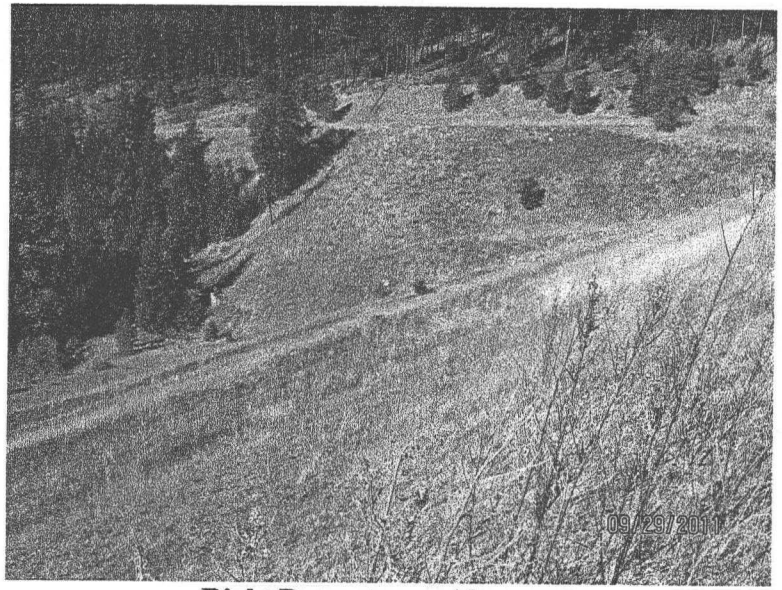

**Downstream Crest to Left**



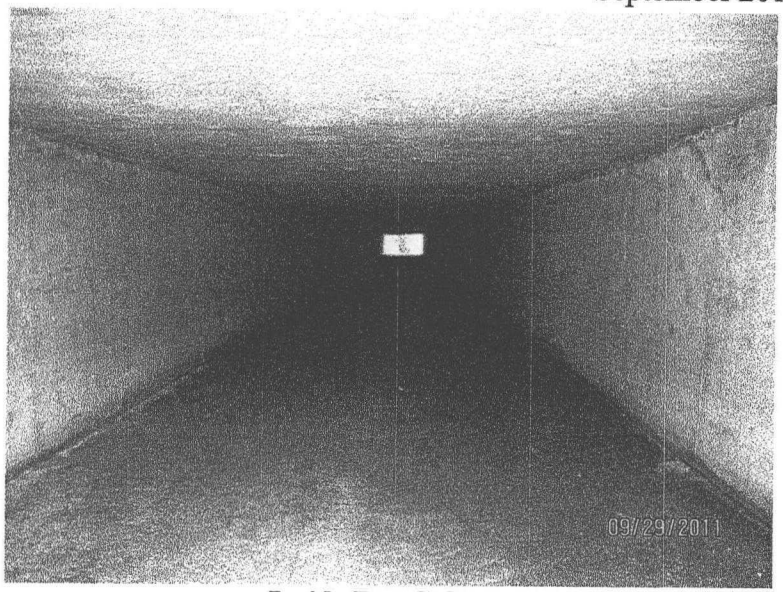

**Downstream Crest to Right**



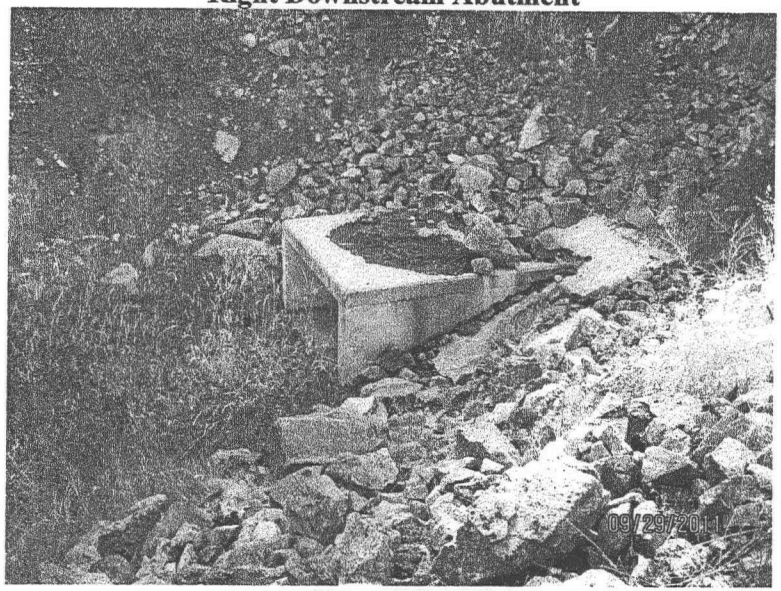

**Left Downstream Abutment**



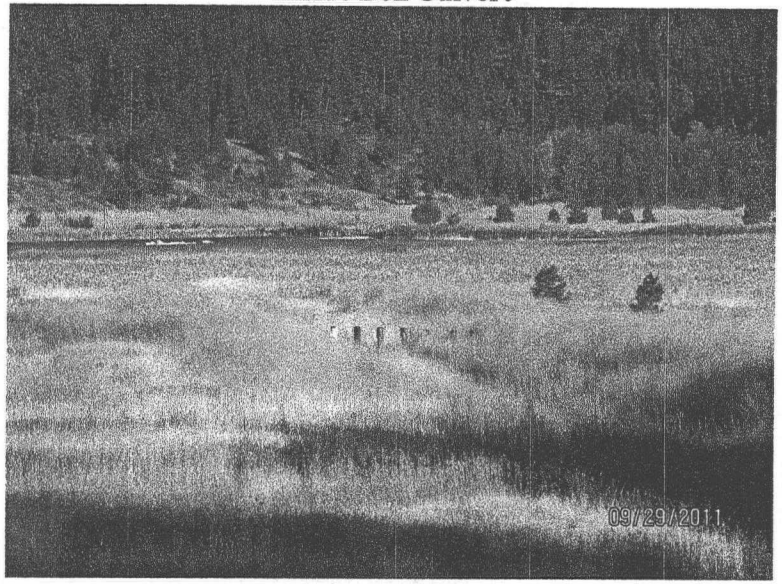

**Right Downstream Abutment**




**Inside Box Culvert**



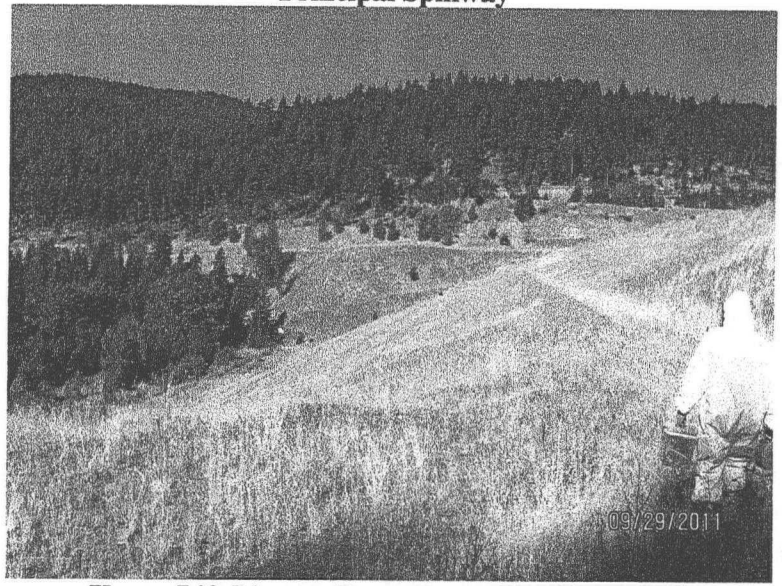

**Box Culvert Entrance**



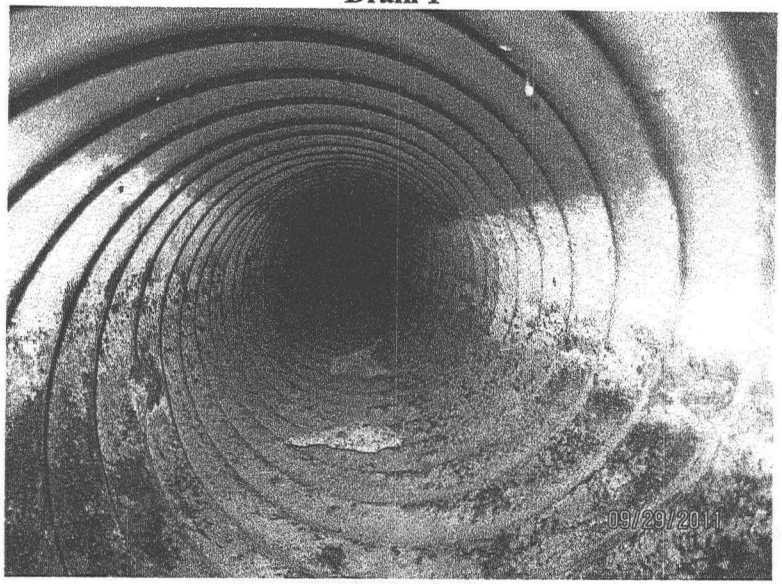

**Trash Rack**


**Principal Spillway**


**Drain 1**



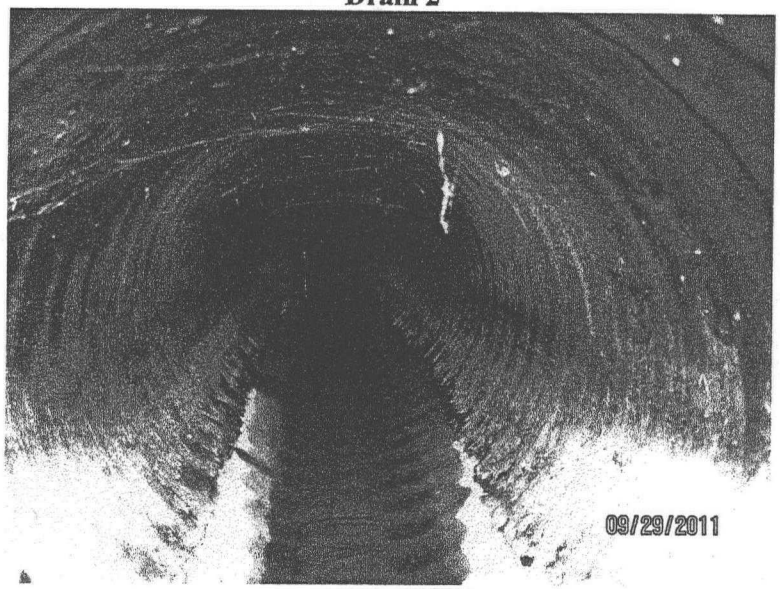

**Upper Lift Line on Downstream Face from Left**



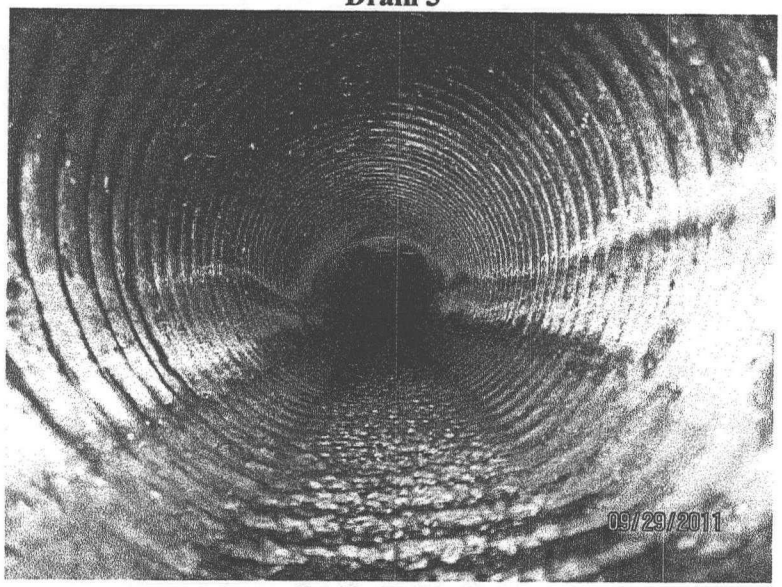

**Inside Drain 1**


**Drain 2**


**Drain 3**




**Inside Drain 2**



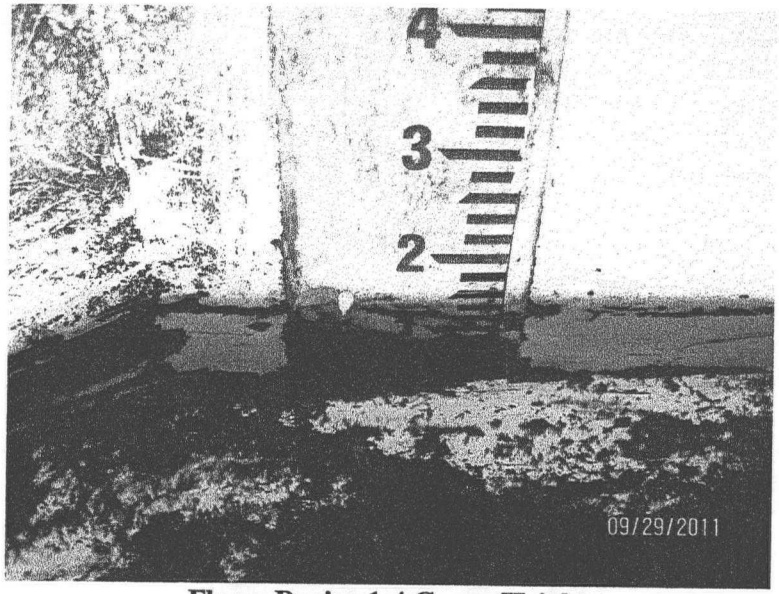

**Inside Drain 3**


**Drain 4**

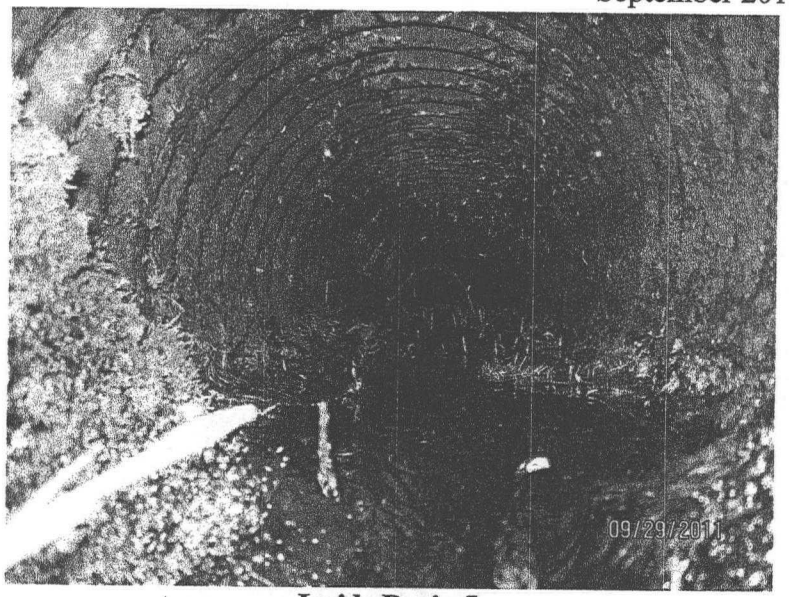

**Inside Drain 4**


**Channel below Drain 3**


**Flume Drains 1-4**



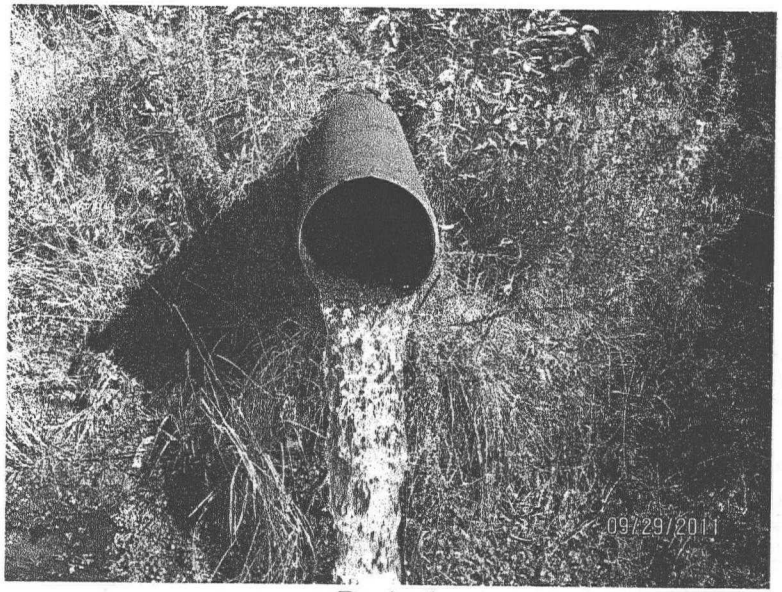

**Flume Drains 1-4 Gauge Height**



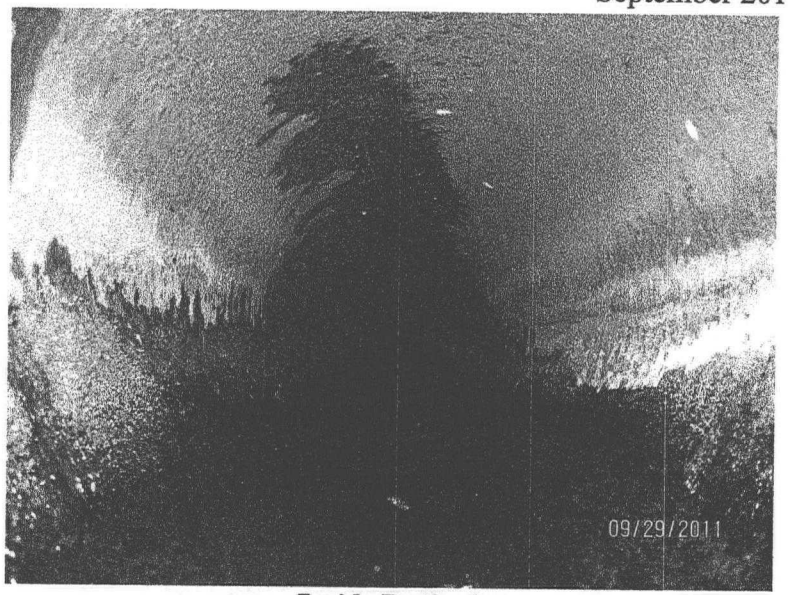

**Inside Drain 5**


**Drain 5**


**Drain 5 Weir**




**Drain 6**



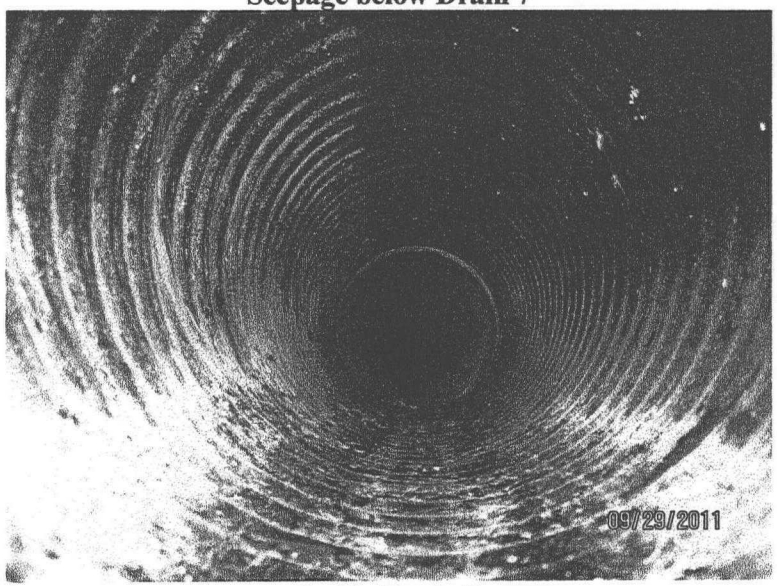

**Inside Drain 6**


**Drain 6 Side View – Low Flow**


**Drain 7 and 8**


**Seepage below Drain 7**

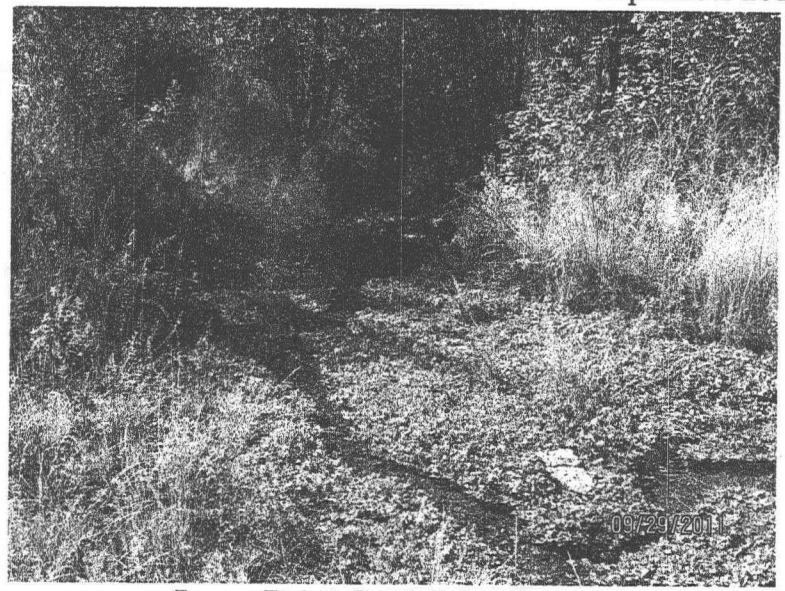

**Drain 8**



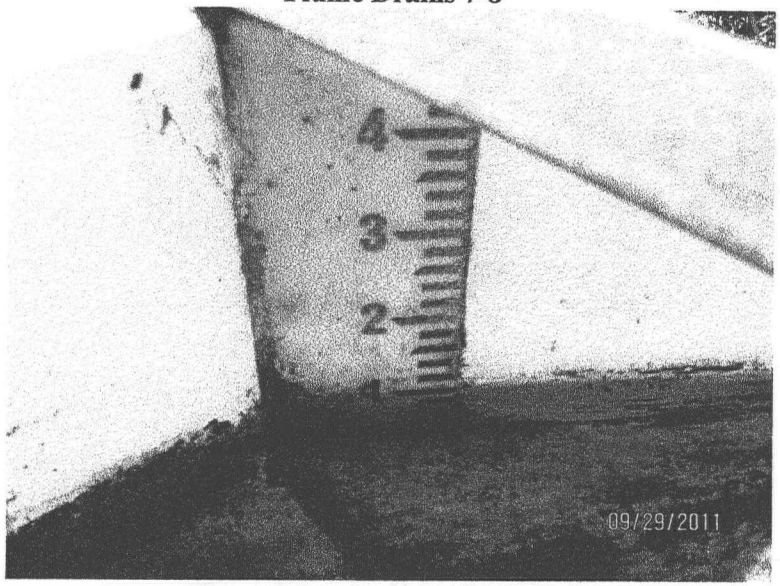

**Inside Drain 7**


**Inside Drain 8**

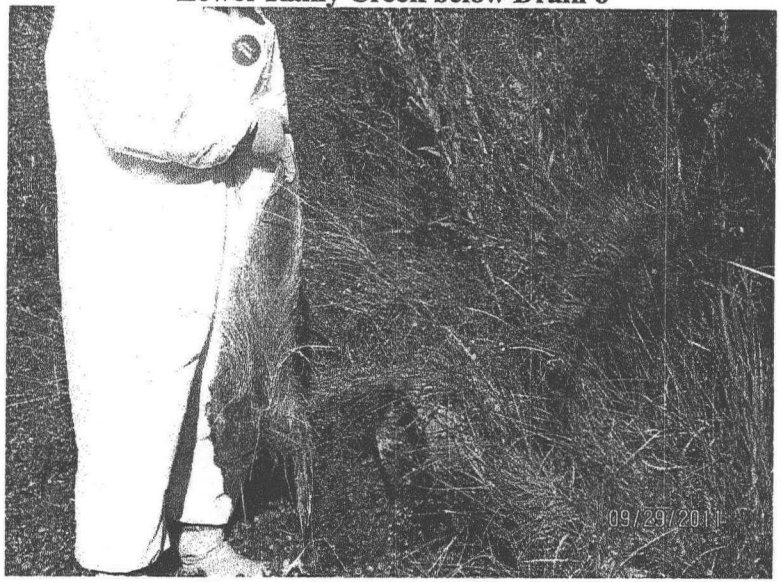

**Flume Drains 7-8**




**Lower Rainy Creek below Drain 6**

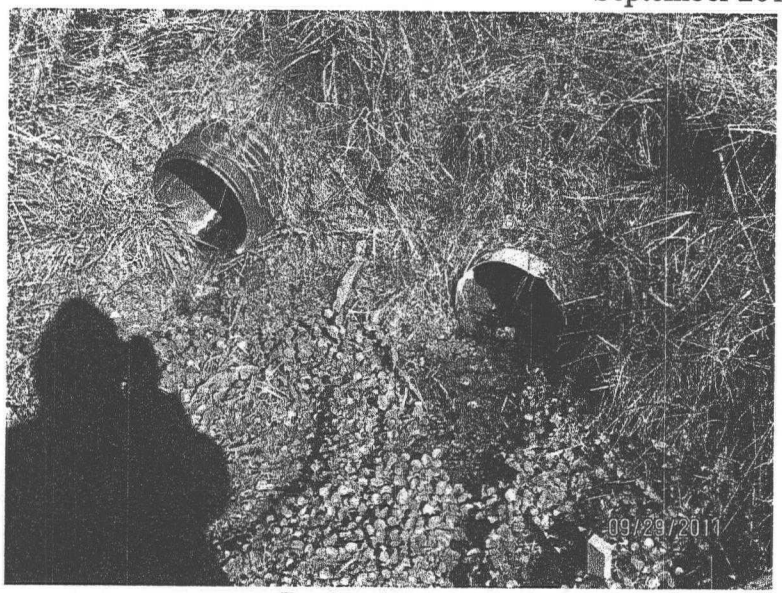



**Flume Drains 7-8 Gauge Height**




**Root wad pulled from Drain 9**

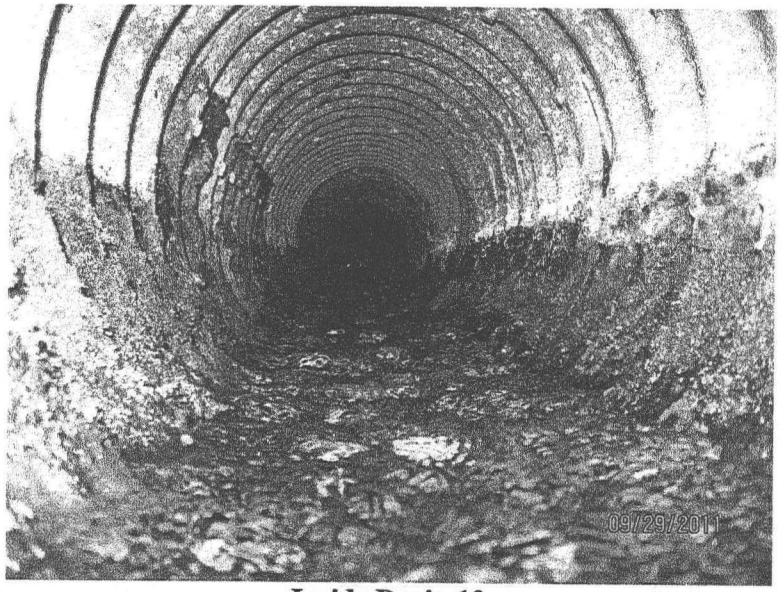

**Drain 9**



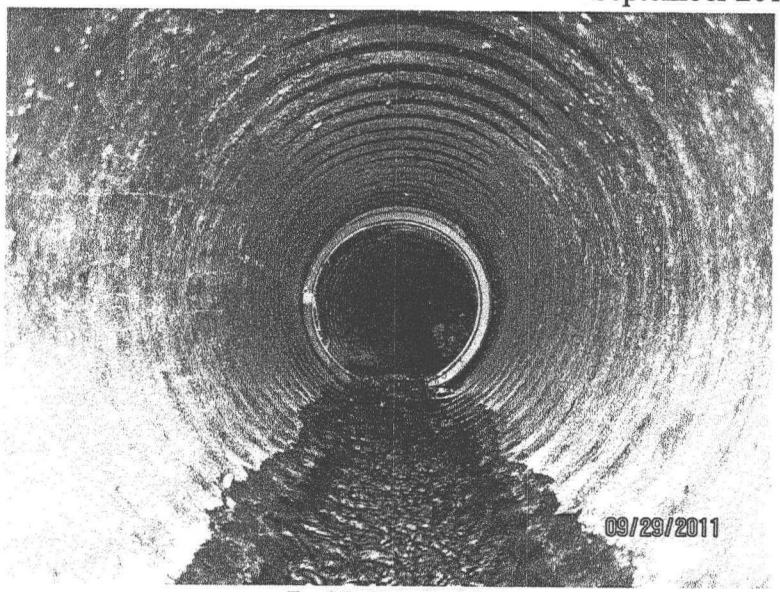

**Drains 10 and 11**


**Inside Drain 9**


**Drain 10**



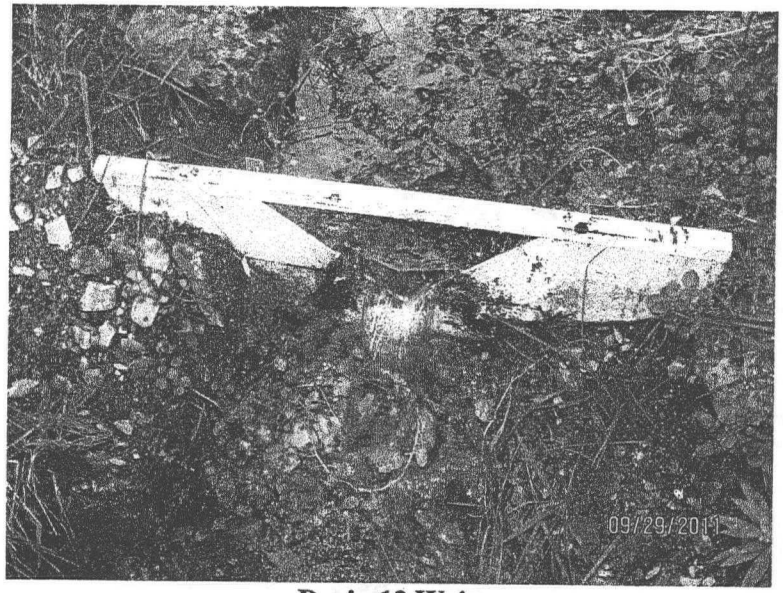

**Inside Drain 10**



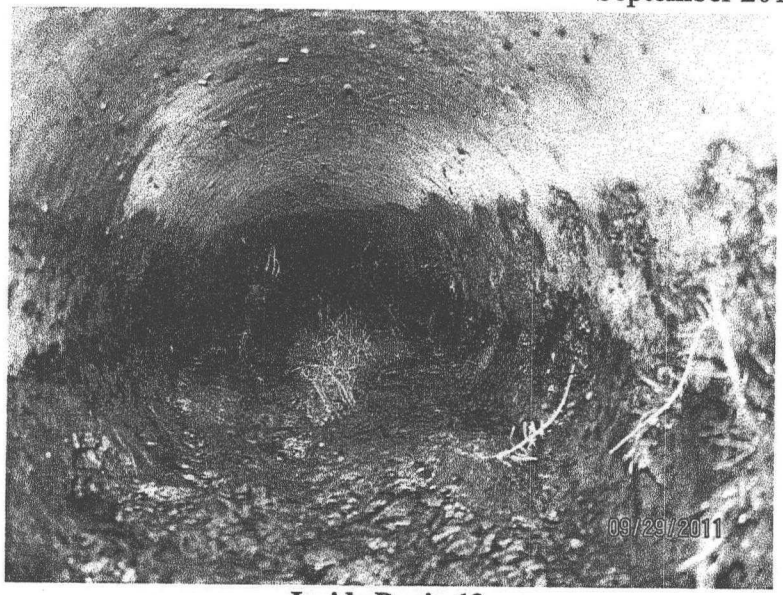

**Inside Drain 11**


**Drain 11**


**Channel below Drain 12**

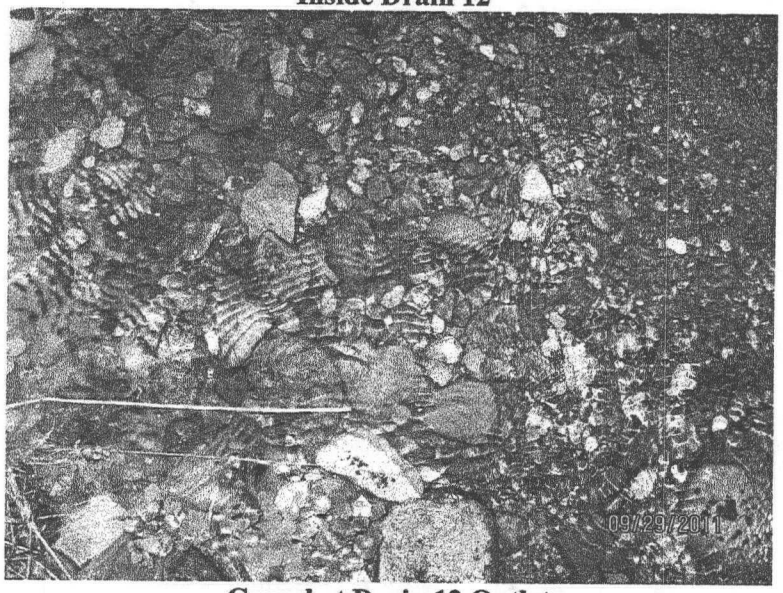



**Drain 12 Weir**



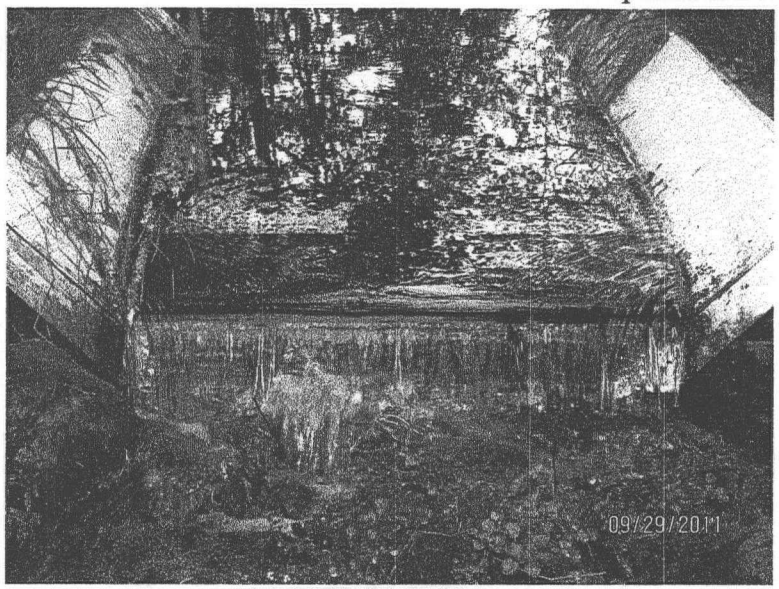

**Inside Drain 12**


**Drain 12**

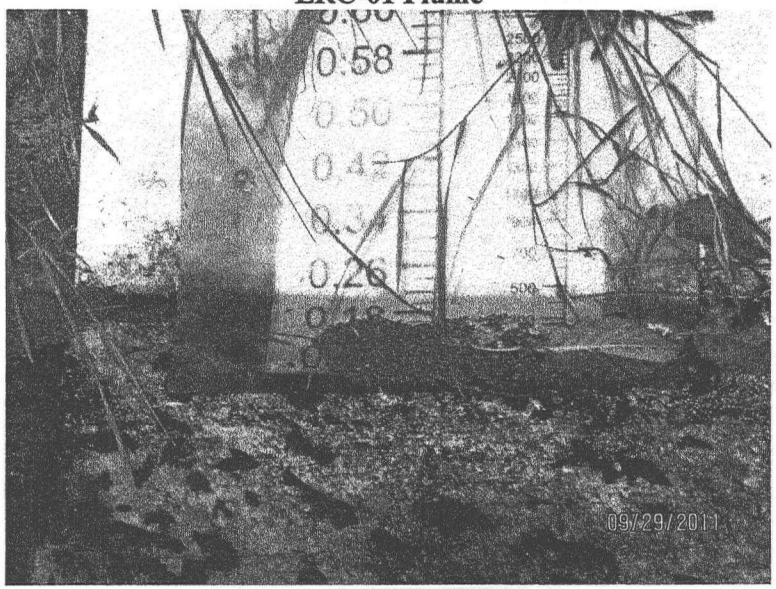



**Gravel at Drain 12 Outlet**


**LRC-01 Flume**



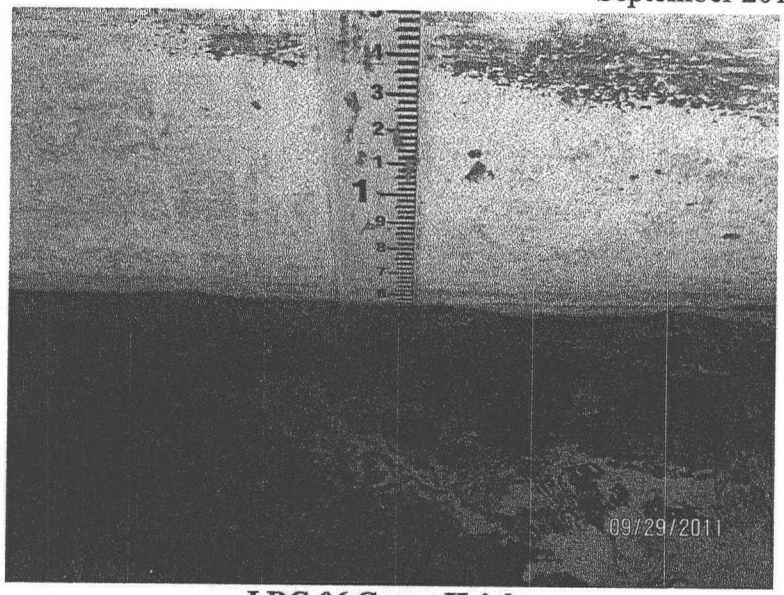

**LRC-01 Outlet**




**LRC-01 Gauge Height**

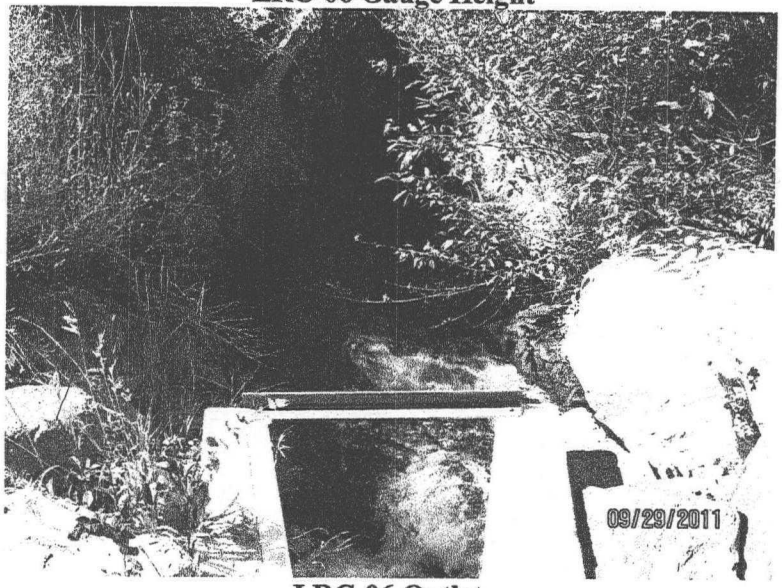

**F-Seep Flume**


**F-Seep Gauge Height**




**LRC-06 Gauge Height**


**LRC-06 Inlet**




**LRC-06 Outlet**

## APPENDIX 2

## PERIODIC INSPECTION REPORT & FIELD NOTES

| | | |
|---|---|---|
| PRINCIPAL INSPECTOR ON SITE: Kurt Hafferman, P.E. | OBSERVATION DATE (S) | 29-Sep-11 |
| OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const. | WEATHER CONDITIONS | Clear, ~40-60°, Calm |
| Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers. | EQUIPMENT | Well probe, long fiberglass tape, camera, flashlight,misc. field equip. |

## EMBANKMENT

| AREA INSPECTED | ITEM NO. | CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| CREST | 1 | GENERAL SURFACE CONDITION | Good, no change | | | | |
| | 2 | DISPLACEMENTS | None | | | | |
| | 3 | EROSION | None | | | | |
| | 4 | CREST ALIGNMENT | Good, no change | | | | |
| | 5 | WEEDS OR BRUSH | No change | | | | |
| | 6 | ANIMAL BURROWS | No change | | | | |
| | 7 | EARTHEN EMERGENCY SPILLWAY | Good, no change | | | | |
| | 8 | | | | | | |
| | 9 | | | | | | |
| UPSTREAM FACE | 10 | SLIDES, DISPLACEMENT OR BUDGES | None | | | | |
| | 11 | EROSION | None | | | | |
| | 12 | WEEDS OR BRUSH | No change | | | | |
| | 13 | PIEZOMETER CASINGS | Good, no change | | | | |
| | 14 | ABUTMENT CONTACTS | Good, no change | | | | |
| | 15 | ANIMALS BURROWS | No change | | | | |
| | 16 | DISTANCE TO WATER | ~400 ft. reservoir GH= 0.77 feet | | | | |
| | 17 | | | | | | |
| | 18 | | | | | | |
| | 19 | | | | | | |

ADDITIONAL COMMENTS, REFER TO ITEM NO. IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM ROUTINE OWNERS INSPECTION REPORT

| | | |
|---|---|---|
| PRINCIPAL INSPECTOR ON SITE: Kurt Hafferman, P.E. | OBSERVATION DATE (S) | 9/29/11 |
| OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const. | WEATHER CONDITIONS | Clear, ~40-60°, Calm |
| Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers. | EQUIPMENT | Well probe, long fiberglass tape, camera, flashlight,misc. field equip. |

| AREA INSPECTED | ITEM NO. | DOWNSTREAM AND INSTRUMENTATION CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| DOWNSTREAM SLOPE | 20 | GENERAL SURFACE CONDITION | Good no change | | | | |
| | 21 | DISPLACEMENTS | None | | | | |
| | 22 | EROSION | None | | | | |
| | 23 | LIFT ALIGNMENTS | Good | | | | |
| | 24 | WEEDS OR BRUSH | No change | | | | |
| | 25 | ANIMALS BURROWS | No change | | | | |
| | 26 | EARTHEN EMERGENCY SPILLWAY | Good, no change | | | | |
| | 27 | SEEPAGE | None | | | | |
| | 28 | ABUTMENT CONTACTS | Good, no change | | | | |
| INSTRUMENTATION | 29 | PIEZOMETERS | Measured, see attached measurements | X | | | |
| | 30 | WEIRS | Gauges read, see attached | X | | | |
| | 31 | FLUMES | Gauges read, see attached | X | | | |
| | 32 | RESERVOIR LEVELS | GH = 0.77' Approx. 22.60 AF | X | | | |
| | 33 | RAINY CREEK INFLOW MEASUREMENTS @ URC02 | GH= 0.38, 130.6 gpm | X | | | |
| | 34 | RAINY CREEK OUTFLOW BELOW DAM @ LRC01 | GH= 0.22, 450 gpm | X | | | |
| | 35 | STREAM OUTFLOW BELOW MILL POND @LRC02 | GH=0.44, 497 gpm | X | | | |
| | 36 | STREAM OUTFLOW FROM CARNEY CREEK @CC02 | GH=0.15, 76.29 gpm | X | | | |
| | 37 | STREAM OUTFLOW FROM RAINY CREEK @LRC06 | GH=0.55, 702 gpm | X | | | |
| | 38 | FLUME 1-2-3-4 | GH=0.15, 14.5 gpm | X | | | |

ADDITIONAL COMMENTS REFER TO ITEM NO. IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM ROUTINE OWNERS INSPECTION REPORT

| | | |
|---|---|---|
| PRINCIPAL INSPECTOR ON SITE: Kurt Hafferman, P.E. | OBSERVATION DATE (S) | 9/29/11 |
| OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const. | WEATHER CONDITIONS | Clear, ~40-60°, Calm |
| Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers. | EQUIPMENT | Well probe, long fiberglass tape, camera, flashlight,misc. field equip. |

| AREA INSPECTED | ITEM NO. | CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| | | **INSTRUMENTATION (CONT.) AND DOWNSTREAM TOE AREA** | | | | | |
| INSTRUMENTATION (CONT.) | 39 | FLUME 10-11-12 | Removed, no longer used | | | | |
| | 40 | FLUME 7-8 | GH=0.11, 5.48 gpm | X | | | |
| | 41 | WEIR 5 | GH= 0.125, 6.43 gpm | X | | | |
| | 42 | WEIR 12 | GH=0..26, 39.57 gpm | X | | | |
| | 43 | DRAIN 6 | GH=0.948, 102.2 gpm | X | | | |
| | 44 | SPILLWAY FLOW | GH=0.00 - Not Running | X | | | |
| | 45 | F-Seep | GH=0.15, 22.7 gpm | X | | | |
| | 46 | Drain 2 | Water continuing to flow | X | X | | |
| | 47 | Drain 1 | No Flow | X | | | |
| DOWNSTREAM TOE | 48 | ABUTMENTS | Good, no change | | | | |
| | 49 | SEEPAGE NEAR TOE | Not noticed | X | | | |
| | 50 | SEEPAGE DOWNSTREAM OF TOE, LEFT SIDE | Not noticed | X | | | |
| | 51 | SEEPAGE IN STREAM CHANNEL, LEFT SIDE | Not noticed | X | X | | |
| | 52 | VEGETATION | Unchanged in last month | X | | | |
| | 53 | CULVERT AT LOWER ROAD | Not monitored | | | | |
| | 54 | SEEPAGE DOWNSTREAM OF TOE, RIGHT SIDE | Not noticed | X | | | |
| | 55 | | | | | | |
| | 56 | | | | | | |

ADDITIONAL COMMENTS, REFER TO ITEM NO. IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM ROUTINE OWNERS INSPECTION REPORT

| | | |
|---|---|---|
| *PRINCIPAL INSPECTOR ON SITE: Kurt Hafferman, P.E.* | OBSERVATION DATE (S) | *9/29/11* |
| *OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const.* | WEATHER CONDITIONS | *Clear, ~40-60°, Calm* |
| *Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers.* | *EQUIPMENT* | *Well probe, long fiberglass tape, camera, flashlight,misc. field equip.* |

| AREA INSPECTED | ITEM NO. | SPILLWAYS CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| PRINCIPAL SPILLWAY (BOX CULVERT AND OPEN CHANNEL CHUTE SPILLWAY) | 58 | ENTRANCE CONDITION | No changes noted | | | | |
| | 59 | CENTERLINE CRACK FLOOR | No changes noted | X | | | |
| | 60 | CENTERLINE CRACK CEILING | No changes noted | X | X | | |
| | 61 | TRANSVERSE JOINTS | No change, same CaCo3 deposits | | | | |
| | 62 | GENERAL CONCRETE | Good to excellent, no change | | | | |
| | 63 | SEEPAGE OR WATER | None noted | X | | | |
| | 64 | OPEN CHANNEL CONCRETE | Good to excellent, no change | | | | |
| | 65 | OPEN CHANNEL JOINTS | Good to excellent, repairs made | X | | | |
| | 66 | OPEN CHANNEL GENERAL | Good | | | | |
| OPEN CHANNEL STEEP CHUTE SPILLWAY | 67 | JOINTS | Good | | | | |
| | 68 | WALL CONCRETE | Visual from above, good | | | | |
| | 69 | FLOOR CONCRETE | Visual from above, good | | | | |
| | 70 | WALL TOPS | Good | | | | |
| | 71 | WEEDS ALONG WALLS | None noted | | | | |
| | 72 | STILLING BASIN RIPRAP | Good | | | | |
| | 73 | WEED AND BRUSH IN STILLING BASIN | No change | | | | |
| | 74 | | | | | | |
| | 75 | | | | | | |
| | 76 | | | | | | |

ADDITIONAL COMMENTS, REFER TO ITEM NO. IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM ROUTINE OWNERS INSPECTION REPORT

| | | |
|---|---|---|
| PRINCIPAL INSPECTOR ON SITE: Kurt Haflerman, P.E. | OBSERVATION DATE (S) | 9/29/11 |
| OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const. | WEATHER CONDITIONS | Clear, ~40-60°, Calm |
| Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers. | EQUIPMENT | Well probe, long fiberglass tape, camera, flashlight,misc. field equip. |

| AREA INSPECTED | ITEM NO. | RESERVOIR AND UPSTREAM DRAINAGE BASIN CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| RESERVOIR | 77 | LEFT SIDE (TAILINGS SLOPE) | Stable | | | | |
| | 78 | RIGHT SIDE | Stable | | | | |
| | 79 | RESERVOIR LEVEL | GH=0.77 ft. | X | | | |
| | 80 | WETLANDS | Good, no change | | | | |
| | 81 | UPPER POND | Full | | | | |
| | 82 | DISTANCE FROM UPSTREAM SLOPE | ~ 400 ft. and receeding | X | | | |
| | 83 | | | | | | |
| | 84 | | | | | | |
| | 85 | | | | | | |
| UPSTREAM DRAINAGE BASIN | 86 | PRECIPITATION WY 2010-20111 AS OF DATE OF INSP. | 133% of normal at Banefield. Entire Basin at 120% of normal | X | | | |
| | 87 | RECENT RAINS | 1.0 inches of precipitation in the last month. | X | | | |
| | 88 | FIRE DANGER | Medium-High | | | | |
| | 89 | CHANGES | None | | | | |
| | 90 | VEGETATION | No change In past month | | | | |
| | 91 | RAINY CREEK DRAINAGE | Continued decline in flows | | | | |
| | 92 | FLEETWOOD CREEK DRAINAGE | Continued decline in flows | | | | |
| | 93 | MINE SITE | ER continues opperations for the summer | | | | |
| | 94 | | | | | | |
| | 95 | | | | | | |

ADDITIONAL COMMENTS, REFER TO ITEM NO. IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM ROUTINE OWNERS INSPECTION REPORT

| | | |
|---|---|---|
| PRINCIPAL INSPECTOR ON SITE: Kurt Hafferman, P.E. | OBSERVATION DATE (S) | 9/29/11 |
| OTHER PERSONNEL ON SITE: Dan Nelson from BHI and Jeremy Peterson from Chapman Const. | WEATHER CONDITIONS | Clear, ~40-00°, Calm |
| Work Tasks: Measure flows, check URC02 and Fleetwood Creek, take reservoir level, measure piezometers, check drains, drain flow, gauge height at LRC01, CC02 , LRC02 and LRC06, Download transducers. | EQUIPMENT | Well probe, long fiberglass tape, camera, flashlight,misc. field equip. |

| AREA INSPECTED | ITEM NO. | EARTHEN SPILLWAY AND MILL POND AND OTHER — CONDITION | OBSERVATION | CHECK ACTION NEEDED: MONITOR | INVESTIGATE | REPAIR | OTHER |
|---|---|---|---|---|---|---|---|
| EARTHEN SPILLWAY | 96 | LEFT SIDE NEXT TO CREST | Good, no change | | | | |
| | 97 | RIGHT SIDE | Good, no change | | | | |
| | 98 | RESERVOIR LEVEL | Normal | | | | |
| | 99 | RIPRAP | Good, no change | | | | |
| | 100 | ROAD CONDITION | Good, no change | | | | |
| | 101 | DOWNSTREAM SLOPE | Good, no change | | | | |
| | 102 | TRASH RACk | No change in past month | X | | | |
| | 103 | | | | | | |
| | 104 | | | | | | |
| MILL POND | 105 | CREST | Good | | | | |
| | 106 | UPSTREAM FACE | Good | | | | |
| | 107 | DOWNSTREAM FACE | Good | | | | |
| | 108 | SPILLWAY FLOW | Flowing | | | | |
| | 109 | RIPRAP IN SPILLWAY | Good, no change | | | | |
| | 110 | ANIMALS ON EMBANKMENT | Not seen | X | | | |
| | 111 | ANIMALS IN SPILLWAY | Not seen | | | | |
| | 112 | RESERVOIR LEVEL | Normal | X | | | |
| OTHER | 113 | Animals Monitoring | None noted during this visit. | X | | | |

ADDITIONAL COMMENTS, REFER TO ITEM NO. IF APPLICABLE

Engineers Certification and Seal

I declare that the data collection and completion of this report titled the September 2011 Routine Owners Inspection Report for the Kootenai Development Impoundment Dam, known as the subject property was completed under my direction. This assessment has revealed the conditions discussed in the inspection form in connection with the property. I declare that the statements made in this report are true to the best of my belief and professional knowledge.

Kurtis M. Hafferman, P.E. MT PE 10457 Date

Location _____ Date _____

Project / Client _____



Location _____ Date _____

Project / Client _____

CLEAR, HAZY
40 - 60°F

KDID
[illegible]
[illegible] 29, 2011
DAD
KMH
5P

Location _____ Date _____

Project / Client _____

FLYNNS

CL-02 47°F

GH = 0.15' LOW FLOW

ISCO = 98.2 gpm

LRC-02 45°F

GH = 0.44' LOW FLOW

ISCO = 536 gpm

FLEETWOOD CREEK 43°F

GH = 0.18' LOW FLOW

URL-02 37°F

GH = 0.38

DOWNLOAD TRANSDUCER @ 10:42 a.m.

RESET DATA TO 0

RESERVOIR 49°F

GH = 0.77

DOWNLOAD TRANSDUCER @ 10.53 a.m.

RESET DATA TO 0

LRC-01

GH = 0.22' 7.480 gpm

DOWNLOAD/RESET TRANSDUCER @ 12:18 p.m.



Location _____ Date _____

Project / Client _____

FLEEP

GH = 0.15'

LRC-00

GH = 0.85'

Location _____ Date _____

Project / Client _____

PIEZOMETERS

| | |
|---|---|
| P | DRY |
| P1 | DRY |
| P2 | 118.29' WATER |
| | DOWNLOAD TRANSDUCER @ 11:18 |
| | RESET TRANSDUCER |
| P3 | DRY |
| P4 | DAMP AT BOTTOM |
| P5 | DAMP AT BOTTOM |
| PM6 | DRY |
| PM2 | 102.28' WATER |
| PM5 | DAMP AT BOTTOM |
| PM4 | DRY |
| PM3 | DAMP AT BOTTOM |
| PM1 | 53.93' |
| A8 | 693 |
| A9 | DRY |
| A10 | DRY |
| A11 | DRY |



Location _____ Date _____

Project / Client _____

Location _____ Date _____

Project / Client _____

DRAINS

| | |
|---|---|
| D1 | DRY, NO FLOW |
| D2 | VERY LOW FLOW, STEADY. INTERMITTENT TRICKLE OF SAND BLOCK MATERIAL +/- 1/4" WATER IN PIPE |
| D3 | LOW FLOW, CLEAR/ STEADY. +/- 3/4" WATER IN PIPE |
| D4 | LOW FLOW, CLEAR/STEADY +/- 1/2" WATER IN PIPE, |
| F 1-4 | GH = 0.15' |
| D5 | HIGH FLOW FOR TIME OF YEAR, CLEAR/ STEADY |
| W5 | GH = 1 1/2" |
| D6 | GH = 1' 3/8" LOW FLOW FOR DRAIN CLEAR/ STEADY |
| D7 | NO FLOW IN PIPE, STEADY SEEPAGE STREAM UNDER PIPE. MORE THAN NORMAL |
| D8 | LOW FLOW, TYPICAL FOR THIS TIME CLEAR/ STEADY +/- 3/8" WATER IN PIPE |
| F7-8 | GH = 0.11' |
| D9 | ROOT WAD PULLED REMOVED FROM PIPE LOW FLOW +/- 1" WATER IN PIPE. |
| D10 | ABOVE NORMAL FLOW CLEAR/ STEADY +/- 1 1/2" WATER IN PIPE |



Location _____ Date _____

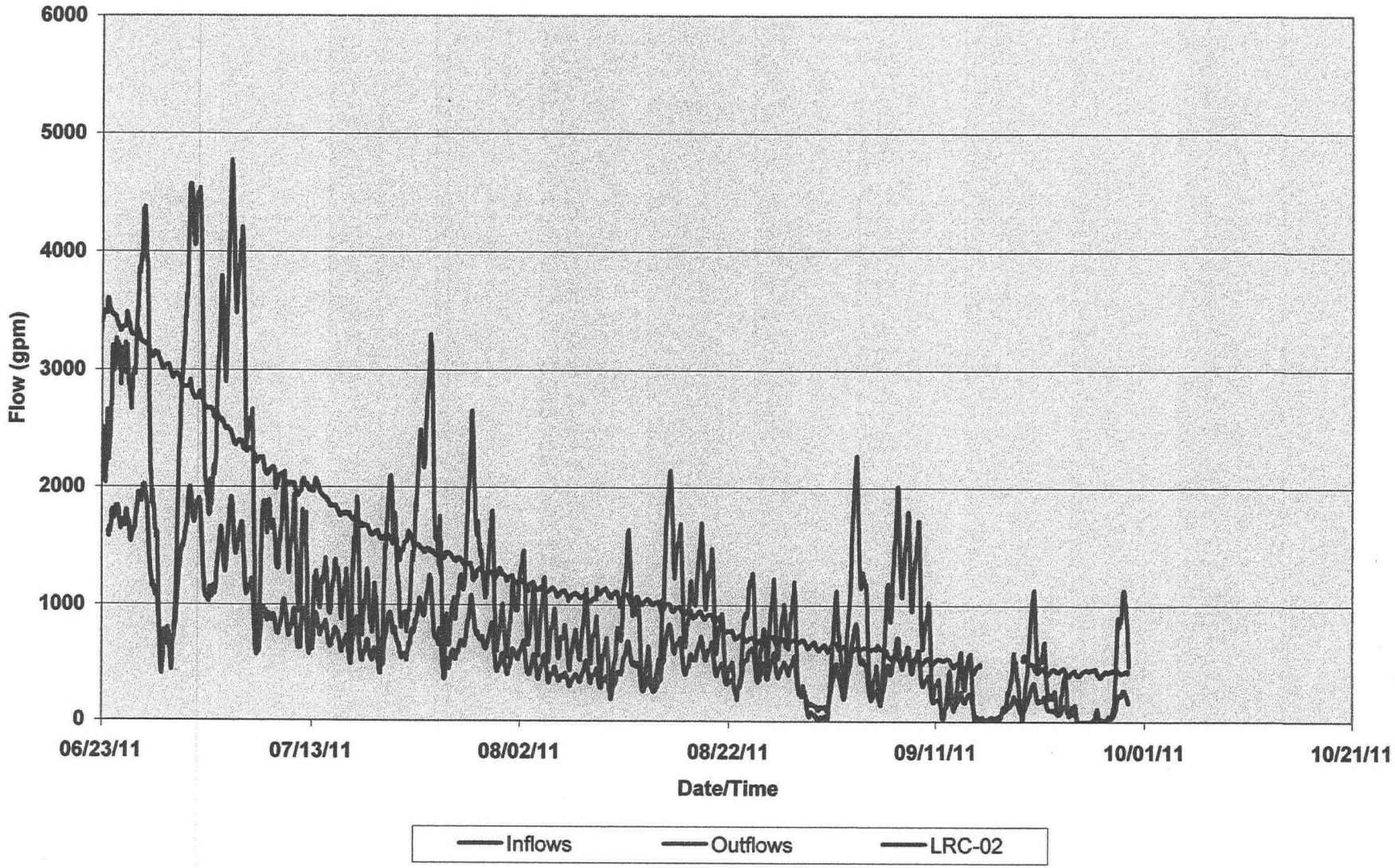
Project / Client _____

| | |
|---|---|
| D11 - | NORMAL FLOW CLEAR/ STEADY +/- 5/8" WATER IN PIPE. |
| D12 - | CONTINUED ABOVE NORMAL FLOW CLEAR/ STEADY 2" + ROUND ROCKS AT OUTLET. |
| W12 - GH = | 3 1/8" |

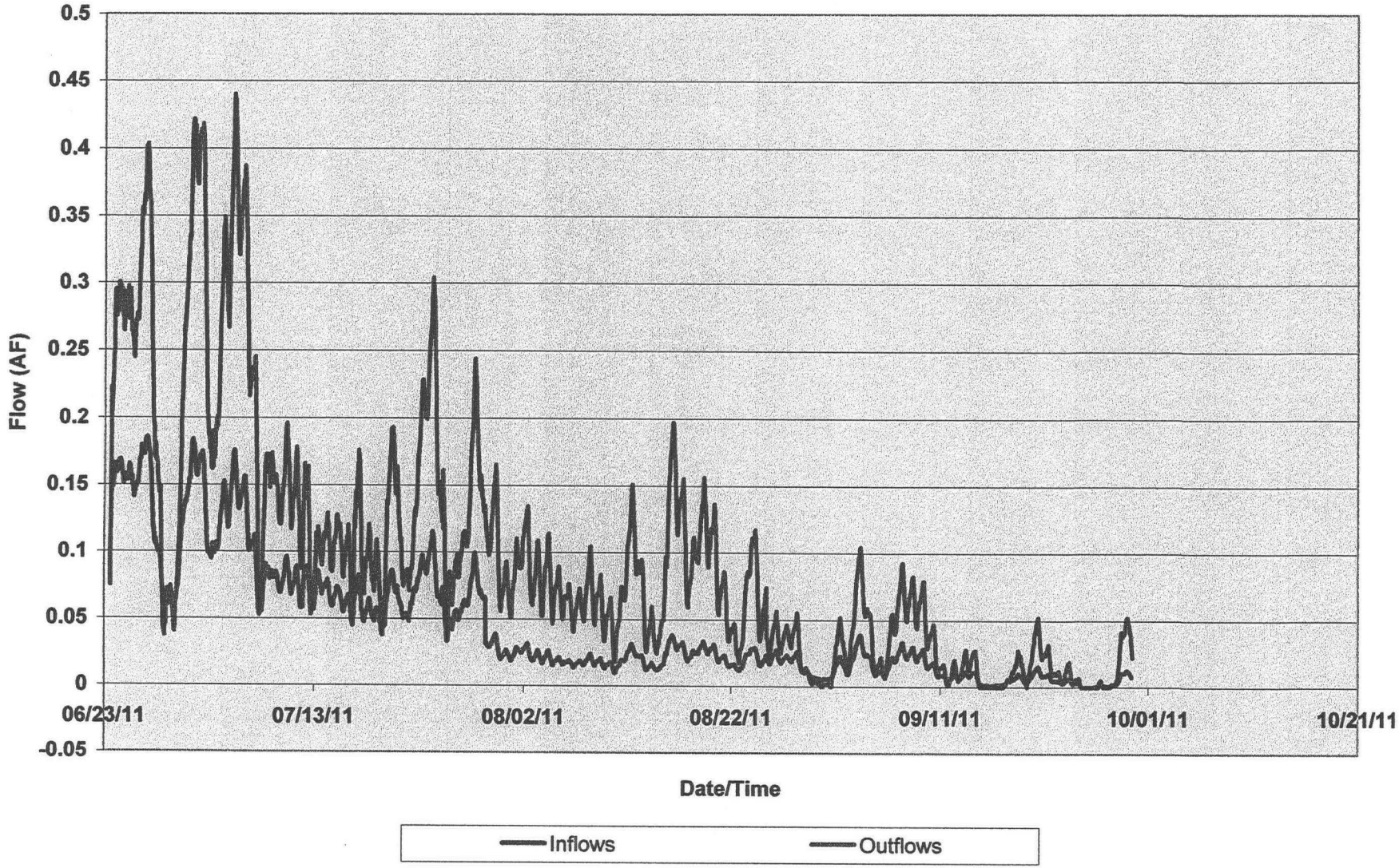
## APPENDIX 3

## UPDATED PIEZOMETER DATA AND GRAPHS

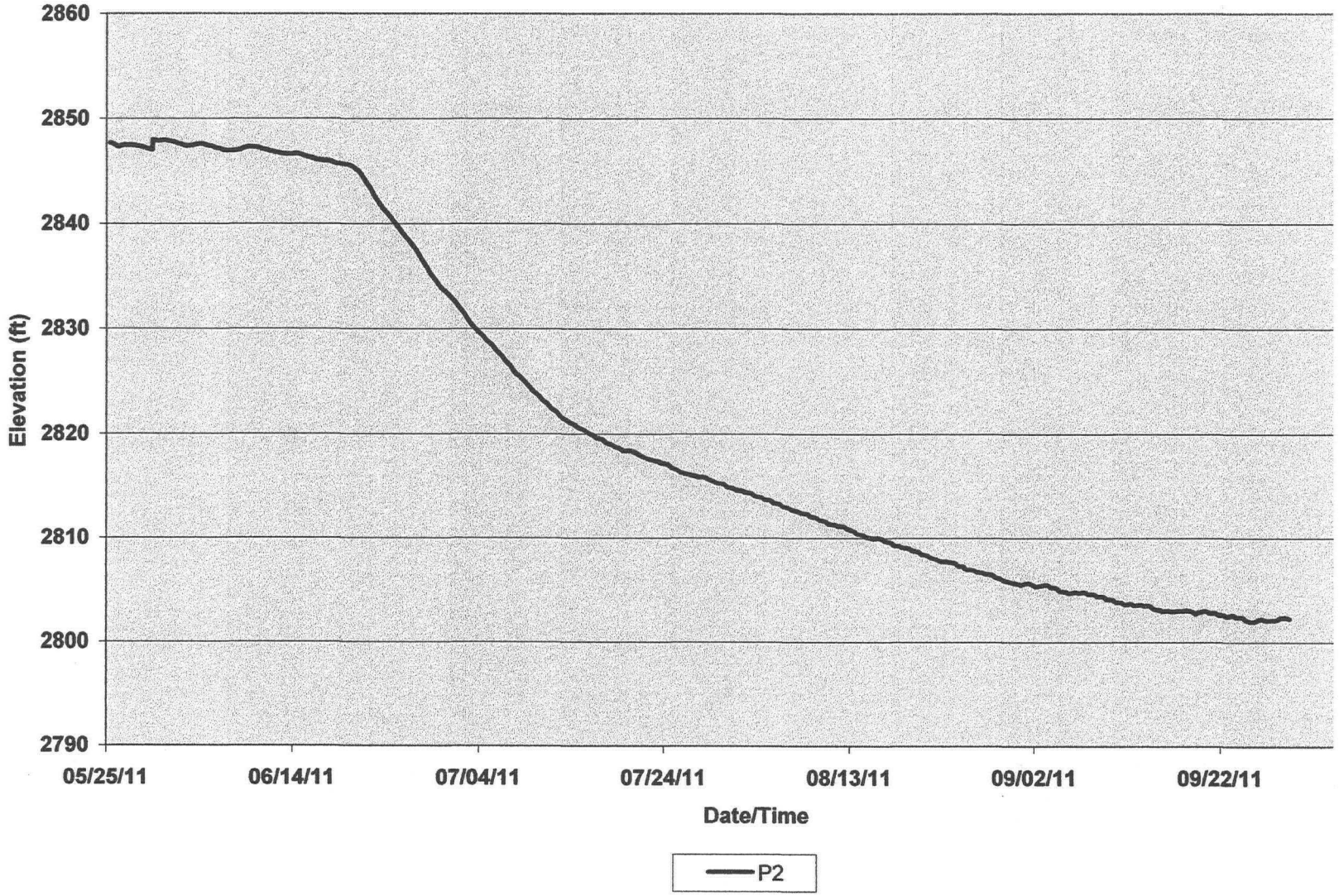
## Inflows vs. Outflows June 23, 2011 to September 25, 2011

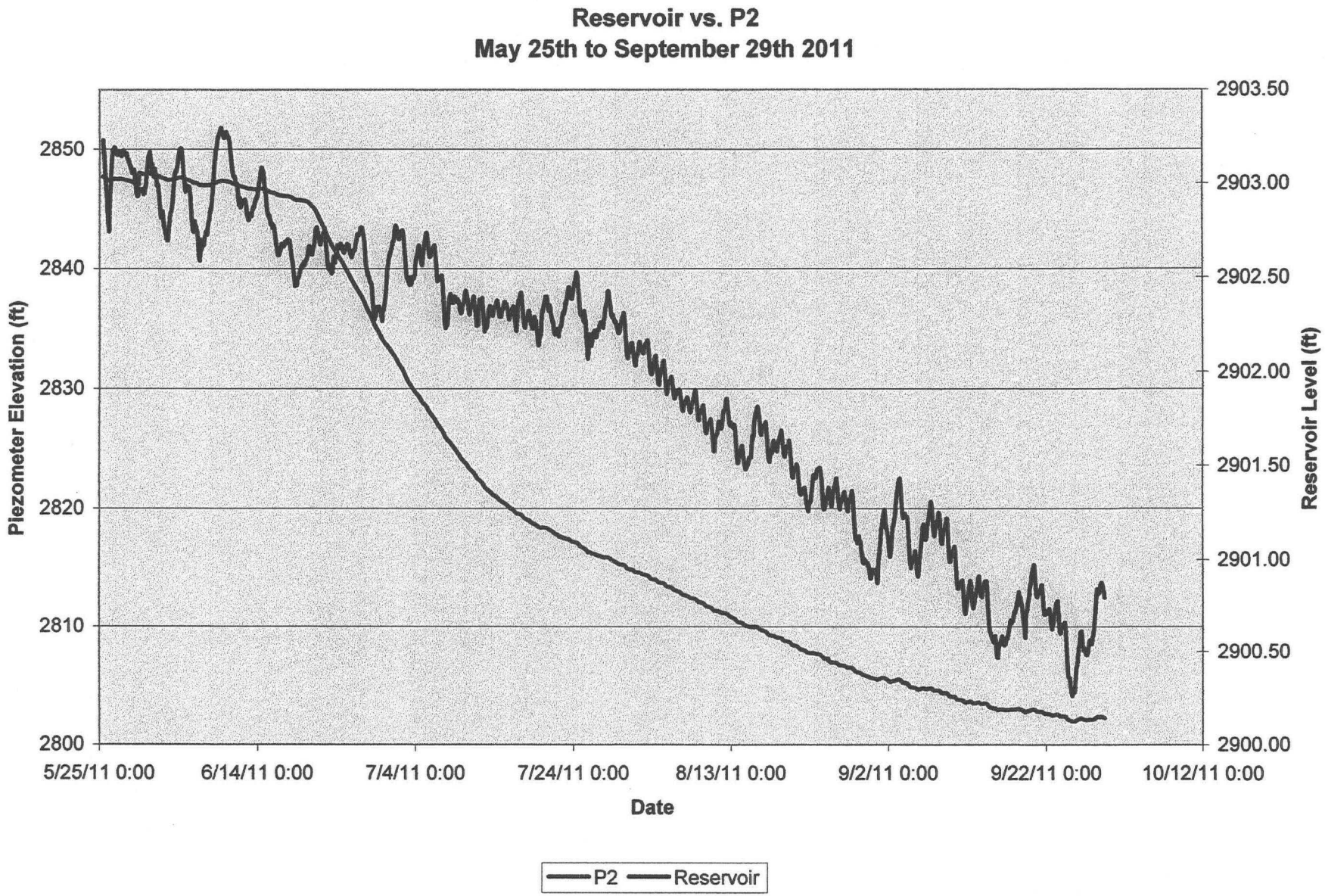


## Inflow Volume vs. Outflow Volume June 23, 2011 to August 25, 2011



## Piezometer P2 May 25, 2011 to September 29, 2011




Reservoir vs. P2
May 25th to September 29th 2011
Piezometer Elevation (ft)
Reservoir Level (ft)
2850
2840
2830
2820
2810
2800
2903.50
2903.00
2902.50
2902.00
2901.50
2901.00
2900.50
2900.00
5/25/11 0:00
6/14/11 0:00
7/4/11 0:00
7/24/11 0:00
8/13/11 0:00
9/2/11 0:00
9/22/11 0:00
10/12/11 0:00
Date
P2
Reservoir

**Kootenai Impoundment Dam** **Stream & Drain Flow Measurements**
R.S6.1

**Gage Heights** **OT= Over Topping**

| Date | W1234 (GH, ft) | W5 (GH, ft) | D6 (GH below top, ft.) | W78 (GH, ft.) | W10,11, 12 (GH, ft.) | W12 (GH, ft) | URC02 (GH, ft.) | LRC06 (GH, ft) | LRC01 (GH, ft) | LRC02 (GH, ft) | CC02 (GH, ft.) | Reservoir (GH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9/25/2007 | 0.036 | 0.089 | | | | 0.161 | | | 0.75 | | | |
| 9/26/2007 | 0.042 | 0.083 | | | | 0.146 | | | | | | |
| 11/9/2007 | 0.0417 | 0.063 | 0.938 | | | 0.146 | | | | | | |
| 12/26/2007 | 0.0417 | 0.083 | 0.969 | | | 0.146 | | | | | | |
| 2/7/2008 | 0.0417 | 0.094 | 0.969 | | | 0.146 | | | | | | |
| 3/10/2008 | 0.0417 | 0.042 | 0.901 | | | 0.177 | | | | | | |
| 4/23/2008 | 0.1094 | 0.115 | 0.844 | | | 0.161 | | | 0.8 | | | |
| 5/16/2008 | **OT** | 0.104 | 0.615 | | | 0.344 | | | 1.15 | | | |
| 5/20/2008 | **OT** | | 0.667 | | | 0.438 | | | | | | |
| 6/3/2008 | **OT** | 0.208 | 0.698 | | | 0.427 | | | 1.24 | | | |
| 7/3/2008 | 0.1771 | 0.125 | 0.771 | | | 0.385 | | | 1.05 | | | |
| 8/8/2008 | 0.08 | 0.104 | 0.823 | | | 0.260 | | | | | | |
| 10/2/2008 | 0.02 | 0.083 | 0.792 | | | 0.208 | | | 0.55 | | | |
| 12/1/2008 | 0.02 | 0.073 | 0.800 | | | 0.229 | | | | | | |
| 12/12/2008 | | | 0.820 | | | | | | | 0.35 | 0.2 | |
| 1/15/2009 | 0.02 | 0.082 | 0.900 | | | 0.198 | 0.29 | | | 0.32 | 0.1 | |
| 2/20/2009 | 0.02 | 0.042 | 0.938 | | | 0.219 | 0.19 | | 0.42 | 0.46 | 0.15 | 1.32 |
| 4/7/2009 | | | 0.860 | | | | | 0.74 | | 0.68 | 0.43 | |
| 4/13/2009 | 0.13 | 0.083 | 0.813 | | | 0.344 | | 0.85 | | 0.65 | 0.43 | |
| 4/24/2009 | 0.36 | | 0.771 | | | 0.406 | | 1.33 | | 1.41 | | 2.15 |
| 4/30/2009 | **OT** | 0.208 | 0.750 | | | 0.417 | 1.14 | 1.265 | | 1.302 | 0.55 | 1.9 |
| 5/1/2009 | 0.83 | 0.188 | 0.760 | | 0.55 | 0.427 | 1.11 | 1.21 | | | | 1.95 |
| 5/5/2009 | 0.80 | 0.167 | 0.745 | 0.168 | 0.522 | 0.417 | | 1.25 | | 1.28 | 0.475 | 2.05 |
| 5/7/2009 | | | | | | | | 1.37 | | 1.38 | 0.52 | |
| 5/19/2009 | 0.85 | | | 0.18 | 0.57 | | 1.47 | | | 1.36 | 0.463 | 2.17 |
| 5/27/2009 | 0.85 | 0.188 | | 0.18 | 0.57 | 0.458 | 1.305 | | 0.97 | | | 2.11 |
| 6/26/2009 | 0.478 | 0.146 | 0.854 | 0.125 | 0.51 | 0.396 | 0.61 | 0.77 | 0.79 | 0.769 | 0.18 | 1.29 |
| 6/29/2009 | | | | | | | 0.565 | | | | | 1.18 |
| 7/24/2009 | 0.250 | 0.104 | | 0.11 | 0.46 | 0.292 | 0.375 | 0.52 | 0.75 | 0.51 | 0.135 | 0.4 |
| 8/21/2009 | 0.12 | | 0.917 | 0.04 | 0.44 | | 0.32 | 0.425 | 0.68 | 0.378 | 0.131 | 0.04 |
| 9/11/2009 | 0.115 | 0.104 | 0.979 | 0.120 | 0.300 | 0.188 | 0.190 | 0.38 | 0.640 | 0.315 | 0.14 | -0.30208 |
| 10/23/2009 | | 0.083 | 0.927 | 0.120 | 0.305 | 0.167 | 0.160 | 0.385 | | 0.29 | 0.14 | -0.4 |
| 11/25/2009 | 0.100 | 0.083 | 0.990 | 0.130 | 0.290 | 0.162 | 0.320 | 0.45 | | 0.35 | 0.19 | 0.19 |
| 12/29/2009 | 0.120 | 0.063 | 0.969 | 0.155 | 0.305 | 0.177 | 0.315 | 0.42 | 0.590 | | | 0.13 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/29/2010 | 0.120 | 0.052 | 0.969 | 0.130 | 0.320 | 0.188 | 0.310 | 0.46 | 0.620 | 0.37 | 0.21 | 0.15 |
| 3/3/2010 | 0.130 | 0.042 | 0.990 | 0.120 | 0.320 | 0.198 | 0.340 | | 0.650 | 0.40 | 0.24 | 0.16 |
| 3/26/2010 | 0.130 | 0.073 | 0.953 | 0.110 | 0.320 | 0.210 | 0.468 | | | 0.465 | 0.27 | 0.325 |
| 4/30/2010 | 0.240 | 0.083 | 0.886 | 0.130 | 0.380 | 0.210 | 0.591 | 0.585 | 0.710 | 0.547 | 0.277 | 0.92 |
| 6/3/2010 | 0.210 | 0.073 | 0.922 | 0.120 | | 0.281 | 0.520 | | 0.710 | 0.55 | 0.275 | 0.90 |
| 6/25/2010 | 0.28 | | 0.885 | 0.100 | | 0.333 | 0.848 | 0.062 | | 0.597 | 0.297 | 1.55 |
| 8/2/2010 | 0.21 | 0.073 | 0.896 | 0.100 | | 0.281 | 0.33 | | 0.68 | 0.425 | 0.136 | 0.55 |
| 8/23/2010 | 0.16 | 0.040 | 0.948 | 0.100 | | 0.210 | 0.240 | 0.375 | 0.640 | 0.339 | 0.126 | 0.130 |
| 9/28/2010 | 0.14 | 0.031 | 0.937 | 0.130 | | 0.210 | 0.305 | 0.380 | 0.660 | 0.310 | 0.170 | 0.020 |
| 11/30/2010 | 0.12 | 0.010 | 0.979 | 0.120 | | 0.208 | 0.320 | 0.440 | 0.670 | | | |
| 1/7/2011 | 0.12 | 0.010 | 0.958 | 0.130 | | 0.167 | 0.350 | 0.510 | 0.700 | 0.400 | 0.310 | -0.400 |
| 2/4/2011 | 0.14 | 0.040 | 0.916 | 0.120 | | 0.208 | 0.380 | | 0.200 | 0.450 | | |
| 3/4/2011 | 0.14 | 0.020 | 0.938 | 0.140 | | 0.193 | 0.380 | 0.510 | 0.210 | 0.460 | 0.380 | -0.030 |
| 3/31/2011 | 0.24 | 0.063 | 0.875 | 0.130 | | 0.323 | 0.720 | 0.800 | 0.280 | 0.730 | 0.490 | 0.450 |
| 5/4/2011 | 0.89 | 0.167 | 0.708 | 0.200 | | 0.531 | 1.690 | 1.770 | 0.580 | 1.980 | 0.770 | 2.890 |
| 5/18/2011 | 0.98 | 0.218 | 0.688 | 0.200 | | 0.583 | 2.540 | OT | 0.660 | OT | 1.020 | 3.330 |
| 5/25/2011 | 0.98 | 0.239 | 0.688 | 0.210 | | 0.563 | 1.720 | 1.630 | 0.660 | 1.520 | 0.730 | 3.210 |
| 6/23/2011 | 0.94 | 0.292 | 0.688 | 0.200 | | 0.531 | 1.320 | 1.700 | 0.640 | 1.690 | 0.430 | 2.750 |
| 7/29/2011 | 0.51 | 0.187 | 0.802 | 0.130 | | 0.395 | 0.760 | 0.900 | 0.390 | 0.860 | 0.220 | 2.240 |
| 8/25/2011 | 0.25 | 0.146 | 0.849 | 0.100 | | 0.333 | 0.490 | 0.650 | 0.300 | 0.580 | 0.140 | 1.370 |
| 9/29/2011 | 0.15 | 0.125 | 0.948 | 0.110 | | 0.260 | 0.380 | 0.550 | 0.220 | 0.440 | 0.150 | 0.770 |

| | P | A8 | P2 | PM1 | PM2 | P1 | P3 | P4 | P5 | PM3 | PM4 | PM5 | PM6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft | ft |
| 4/24/2008 | 100.5 | 7.60 | 114.42 | 50.16 | 101.1 | 103.39 | 60.65 | 106.24 | 104.35 | 51.78 | 41.12 | 50.2 | 66.82 |
| 5/30/2008 | | 2.71 | | 48.2 | 88 | | | | | | | | |
| 6/30/2008 | | 2.93 | | 48.36 | 90.71 | | | | | | | | |
| 7/3/2008 | 100.34 | 4.65 | 105.4 | 49.73 | 97.49 | 101.9 | dry | 102.48 | 104.28 | 51.59 | dry | dry | dry |
| 8/8/2008 | dry | 6.97 | 117.8 | 53.12 | 101.1 | dry | dry | dry | 104.34 | 51.79 | dry | dry | dry |
| 10/1/2008 | | 8.09 | | 53.94 | | | | | | | | | |
| 1/15/2009 | 100.7 | 8.30 | 120.4 | 53.86 | 104.11 | 103.7 | 60.5 | 106.21 | 104.36 | 51.78 | 41.13 | 49.98 | 66.71 |
| 2/20/2009 | | 8.20 | 119.9 | 53.69 | 103.75 | | | | | | | | |
| 4/13/2009 | 101.55 | 6.88 | 112.87 | 51.43 | 100.24 | 103.8 | 60.4 | 106.05 | 103.44 | 51.78 | 41.1 | 50 | 66.8 |
| 4/24/2009 | dry | 4.59 | 98.18 | 45.37 | 92.13 | 103.68 | dry | 97.45 | 102.82 | 49.63 | dry | dry | dry |
| 4/30/2009 | dry | 3.48 | 91.55 | 44.66 | 87.81 | dry | dry | 91.28 | 99.09 | 49.69 | dry | dry | dry |
| 5/1/2009 | | 3.44 | 91.45 | | | | | | | | | | |
| 5/5/2009 | dry | 3.41 | 91.68 | 45.71 | 88.15 | 101.58 | dry | 98.97 | 98.71 | dry | dry | 50.8 | |
| 5/27/2009 | dry | 2.65 | 90.4 | 45.62 | 89.6 | 96.88 | dry | 88.25 | 97.97 | 50.12 | 41.51 | dry | dry |
| 6/26/2009 | dry | 4.57 | 105.24 | 50.6 | 97.24 | 102.39 | dry | 102.21 | 104.25 | 50.02 | dry | 51.57 | dry |
| 6/29/2009 | | 4.75 | 106.36 | | | | | | | | | | |
| 7/24/2009 | dry | 6.42 | 114.13 | 52.07 | 100.41 | dry | dry | dry | dry | 50.02 | dry | dry | dry |
| 8/21/2009 | dry | 7.66 | 118.67 | 53.42 | 102.18 | dry | dry | 106.2 | dry | dry | dry | 50.04 | dry |
| 9/11/2009 | dry | 8.20 | 119.91 | 53.69 | 103.39 | dry | dry | dry | dry | dry | dry | dry | dry |
| 10/23/2009 | dry | 8.30 | 120.85 | 53.81 | 104.22 | dry | dry | dry | dry | dry | dry | dry | dry |
| 11/25/2009 | dry | 8.31 | 120.56 | 63.71 | 104.25 | dry | dry | dry | dry | dry | dry | dry | dry |
| 12/29/2009 | dry | 8.37 | 120.64 | 53.74 | 104.28 | dry | dry | dry | dry | dry | dry | dry | dry |
| 1/29/2010 | dry | 8.32 | 120.24 | 53.65 | dry | dry | dry | dry | | | dry | dry | dry |
| 3/3/2010 | dry | 7.37 | 116.42 | 52.25 | 102.02 | dry | dry | dry | dry | dry | dry | dry | dry |
| 3/26/2010 | dry | 8.19 | 114.49 | 53.39 | 103.62 | dry | dry | dry | dry | dry | dry | dry | dry |
| 6/3/2010 | dry | 7.40 | 117.15 | 52.44 | 102.27 | dry | dry | dry | dry | dry | dry | dry | dry |
| 6/25/2010 | dry | 6.75 | 113.52 | 51.41 | 100.67 | dry | dry | dry | 104.09 | 51.52 | dry | dry | dry |
| 8/2/2010 | dry | 6.96 | 117.35 | 52.15 | 102.3 | dry | dry | dry | dry | 51.76 | dry | dry | dry |
| 9/28/2010 | dry | 8.34 | | 53.15 | 104.4 | dry | dry | dry | dry | dry | dry | dry | dry |
| 10/29/2010 | dry | 8.30 | 120.68 | 52.92 | 104.43 | dry | dry | dry | dry | dry | dry | dry | dry |
| 11/30/2010 | dry | 8.26 | 120.25 | 52.5 | 104.25 | dry | dry | dry | dry | dry | dry | 50.07 | dry |
| 1/7/2011 | dry | 8.15 | 119.75 | 51.95 | 103.85 | dry | dry | dry | dry | dry | dry | 50.07 | dry |
| 2/4/2011 | dry | 7.21 | 118.64 | 51.61 | 103.16 | dry | dry | dry | dry | dry | dry | 50.06 | dry |
| 3/4/2011 | dry | 7.48 | 118.1 | 51.58 | 102.3 | dry | dry | dry | dry | dry | dry | 51 | dry |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/31/2011 | dry | 6.37 | 115.25 | 51.36 | 101.53 | 103.67 | dry | dry | 103.54 | 51.78 | dry | 50.06 | dry |
| 5/4/2011 | dry | 2.40 | 84.02 | 38.2 | 81.96 | 98.58 | 60.5 | 85.84 | 96.4 | 47.98 | 41.16 | 50.06 | 66.84 |
| 5/18/2011 | dry | 1.40 | 72.25 | 34.42 | 75.14 | 90.16 | dry | 71.97 | 94.14 | 46.3 | 40.14 | 50.06 | dry |
| 5/25/2011 | dry | 1.30 | 72.98 | 33.88 | 74.51 | 89.27 | dry | 70.58 | 93.9 | 46.03 | 40.32 | 50.07 | dry |
| 6/23/2011 | dry | 1.30 | 78.73 | 35.53 | 82.62 | 88.22 | dry | 75.04 | 94.18 | 46.85 | 41.12 | dry | dry |
| 7/29/2011 | dry | 4.10 | 105.09 | 50.73 | 94.01 | 100.23 | dry | 101.6 | 103.99 | 51.32 | 41 | 50.1 | dry |
| 8/25/2011 | dry | 5.27 | 113.29 | 53.14 | 98.89 | dry | dry | 106.21 | 104.28 | 51.57 | 41.17 | 50.07 | dry |
| 9/29/2011 | dry | 6.93 | 118.29 | 53.93 | 102.28 | dry | dry | 106.21 | 104.28 | 51.76 | dry | 50.07 | dry |
| | | | | | | | | | | | | | |

From S:\DOCUMENT\JOB FILES\Jobs\R\R_56_01\Documents\Annual Inspection\PIEZOMETERS

Billmayer & Hafferman Inc.
Kootenai Development Impoundment Dam Annual Inspection
3-Nov-10 Last Update
Haffeman Bold = interpolated values
Wet Piezometer Plots

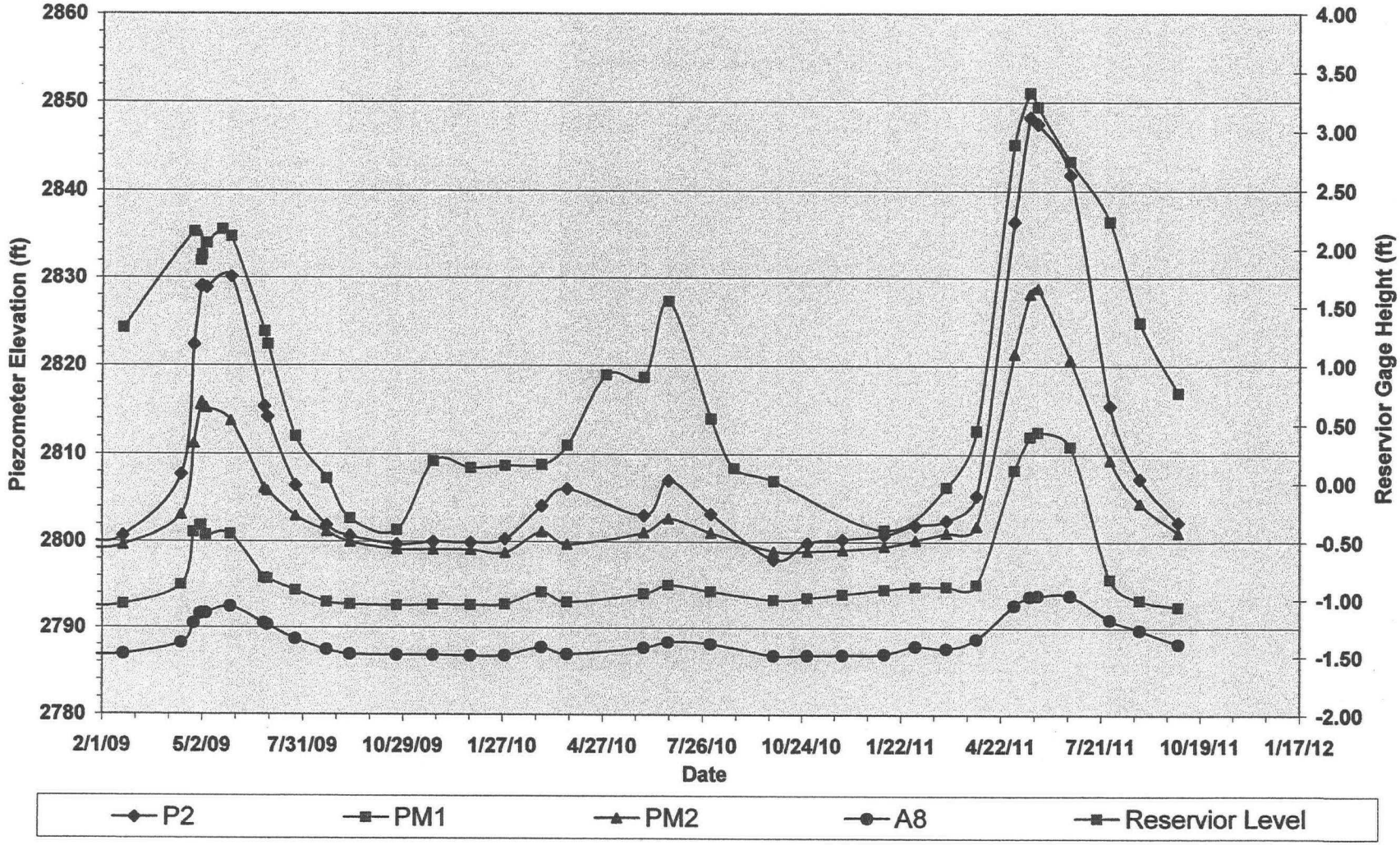
| Piezometer Num | P2 | | Elev. | PM1 | | Elev. | PM2 | | Elev. | A8 | | Elev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T.O.C.= | 2920.54 | | T.O.C.= | 2846.41 | | T.O.C.= | 2903.34 | | T.O.C.= | 2795.11 |
| Date | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev |
| 9/29/2011 | 118.29 | 122.23 | 2802.25 | 53.93 | 54.92 | 2792.48 | 102.28 | 104.88 | 2801.06 | 6.93 | 28.23 | 2788.18 |
| 8/25/2011 | 113.29 | 122.23 | 2807.25 | 63.14 | 54.92 | 2793.27 | 98.89 | 104.88 | 2804.45 | 5.27 | 28.23 | 2789.84 |
| 7/29/2011 | 105.09 | 122.28 | 2815.45 | 50.73 | 54.91 | 2795.68 | 94.01 | 104.96 | 2809.33 | 4.1 | 28.26 | 2791.01 |
| 6/23/2011 | 78.73 | 122.28 | 2841.81 | 35.53 | 54.91 | 2810.88 | 82.62 | 104.96 | 2820.72 | 1.3 | 28.26 | 2793.81 |
| 5/25/2011 | 72.98 | 122.28 | 2847.66 | 33.88 | 54.91 | 2812.53 | 74.51 | 104.96 | 2828.83 | 1.3 | 28.26 | 2793.81 |
| 5/18/2011 | 72.25 | 122.28 | 2848.29 | 34.42 | 54.87 | 2811.99 | 75.14 | 104.92 | 2828.2 | 1.4 | 28.24 | 2793.71 |
| 5/4/2011 | 84.02 | 122.28 | 2836.52 | 38.2 | 54.82 | 2808.21 | 81.96 | 104.57 | 2821.38 | 2.4 | 28.25 | 2792.71 |
| 3/31/2011 | 115.25 | 122.27 | 2805.29 | 51.36 | 54.83 | 2795.05 | 101.53 | 104.85 | 2801.81 | 6.37 | 28.24 | 2788.74 |
| 3/4/2011 | 118.1 | | 2802.44 | 51.58 | | 2794.83 | 102.3 | | 2801.04 | 7.48 | | 2787.63 |
| 2/4/2011 | 118.64 | 122.24 | 2801.9 | 51.61 | 54.82 | 2794.8 | 103.16 | 104.77 | 2800.18 | 7.21 | 28.21 | 2787.90 |
| 1/7/2011 | 119.75 | 122 | 2800.79 | 51.95 | 54.85 | 2794.46 | 103.85 | 104.8 | 2799.49 | 8.15 | 28.2 | 2786.96 |
| 11/30/2010 | 120.25 | 122.3 | 2800.29 | 52.5 | 54.85 | 2793.91 | 104.25 | 104.8 | 2799.09 | 8.26 | 28.2 | 2786.85 |
| 10/29/2010 | 120.68 | 122 | 2799.86 | 52.92 | 54.85 | 2793.49 | 104.43 | 104.95 | 2798.91 | 8.3 | 28.2 | 2786.81 |
| 9/28/2010 | 122.6 | 122.1 | 2797.94 | 53.15 | 54.8 | 2793.26 | 104.4 | 104.6 | 2798.94 | 8.34 | 28.3 | 2786.77 |
| 8/2/2010 | 117.35 | 122.1 | 2803.19 | 52.15 | 54.8 | 2794.26 | 102.3 | 104.6 | 2801.04 | 6.96 | 28.3 | 2788.15 |
| 6/25/2010 | 113.52 | 122.1 | 2807.02 | 51.41 | 54.8 | 2795 | 100.67 | 104.6 | 2802.67 | 6.75 | 28.3 | 2788.36 |
| 6/3/2010 | 117.5 | 122.1 | 2803.04 | 52.44 | 54.8 | 2793.97 | 102.27 | 104.6 | 2801.07 | 7.4 | 28.3 | 2787.71 |
| 3/26/2010 | 114.49 | 122.1 | 2806.05 | 53.39 | 54.8 | 2793.02 | 103.62 | 104.6 | 2799.72 | 8.19 | 28.3 | 2786.92 |
| 3/3/2010 | 116.42 | 122.1 | 2804.12 | 52.25 | 54.8 | 2794.16 | 102.2 | 104.6 | 2801.14 | 7.37 | 28.3 | 2787.74 |
| 1/29/2010 | 120.24 | 122.1 | 2800.3 | 53.65 | 54.8 | 2792.76 | 104.6 | 104.6 | 2798.74 | 8.32 | 28.3 | 2786.79 |
| 12/29/2009 | 120.64 | 122.1 | 2799.9 | 53.74 | 54.8 | 2792.67 | 104.28 | 104.6 | 2799.06 | 8.37 | 28.3 | 2786.74 |
| 11/25/2009 | 120.56 | 122.1 | 2799.98 | 53.71 | 54.8 | 2792.7 | 104.25 | 104.6 | 2799.09 | 8.31 | 28.3 | 2786.80 |
| 10/23/2009 | 120.86 | 122.1 | 2799.69 | 53.81 | 54.8 | 2792.6 | 104.22 | 104.6 | 2799.12 | 8.3 | 28.3 | 2786.81 |

| Piezometer Num | P2 | | Elev. | PM1 | | Elev. | PM2 | | Elev. | A8 | | Elev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T.O.C.= | 2920.54 | | T.O.C.= | 2846.41 | | T.O.C.= | 2903.34 | | T.O.C.= | 2795.11 |
| Date | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev |
| 9/11/2009 | 119.91 | 122.1 | 2800.63 | 53.69 | 54.8 | 2792.72 | 103.39 | 104.6 | 2799.95 | 8.2 | 28.3 | 2786.91 |
| 8/21/2009 | 118.67 | 122.1 | 2801.87 | 53.42 | 54.8 | 2792.99 | 102.18 | 104.6 | 2801.16 | 7.66 | 28.3 | 2787.45 |
| 7/24/2009 | 114.13 | 122.1 | 2806.41 | 52.07 | 54.8 | 2794.34 | 100.41 | 104.6 | 2802.93 | 6.42 | 28.3 | 2788.69 |
| 6/29/2009 | 106.36 | 122.1 | 2814.18 | 50.73 | 54.8 | 2795.68 | 97.52 | 104.6 | 2805.82 | 4.75 | 28.3 | 2790.36 |
| 6/26/2009 | 105.24 | 122.1 | 2815.3 | 50.6 | 54.8 | 2795.81 | 97.24 | 104.6 | 2806.1 | 4.565 | 28.3 | 2790.55 |
| 5/27/2009 | 90.4 | 122.1 | 2830.14 | 45.62 | 54.8 | 2800.79 | 89.6 | 104.6 | 2813.74 | 2.65 | 28.3 | 2792.46 |
| 5/5/2009 | 91.68 | 122.1 | 2828.86 | 45.71 | 54.8 | 2800.7 | 88.15 | 104.6 | 2815.19 | 3.41 | 28.3 | 2791.70 |
| 5/1/2009 | 91.45 | 122.1 | 2829.09 | 44.56 | 54.8 | 2801.85 | 87.52 | 104.6 | 2815.82 | 3.44 | 28.3 | 2791.67 |
| 4/30/2009 | 91.55 | 122.1 | 2828.99 | 44.66 | 54.8 | 2801.76 | 87.81 | 104.6 | 2815.53 | 3.48 | 28.3 | 2791.63 |
| 4/24/2009 | 98.18 | 122.1 | 2822.36 | 45.37 | 54.8 | 2801.04 | 92.13 | 104.6 | 2811.21 | 4.59 | 28.3 | 2790.52 |
| 4/13/2009 | 112.87 | 122.1 | 2807.67 | 51.43 | 54.8 | 2794.98 | 100.24 | 104.6 | 2803.1 | 6.88 | 28.3 | 2788.23 |
| 2/20/2009 | 119.9 | 122.1 | 2800.64 | 53.69 | 54.8 | 2792.72 | 103.75 | 104.6 | 2799.59 | 8.2 | 28.3 | 2786.91 |
| 1/15/2009 | 120.4 | 122.1 | 2800.14 | 53.86 | 54.8 | 2792.55 | 104.11 | 104.6 | 2799.23 | 8.3 | 28.3 | 2786.81 |
| 12/1/2008 | 120.61 | 122.1 | 2799.93 | 53.9 | 54.8 | 2792.51 | 104.07 | 104.6 | 2799.27 | 8.21 | 28.3 | 2786.90 |
| 10/30/2008 | 119.17 | 122.1 | 2801.37 | 53.87 | 54.8 | 2792.54 | 103.91 | 104.6 | 2799.43 | 8.18 | 28.3 | 2786.93 |
| 10/2/2008 | 117.9 | 122.1 | 2802.64 | 53.94 | 54.8 | 2792.47 | 104.6 | 104.6 | 2798.74 | 8.09 | 28.3 | 2787.02 |
| 8/8/2008 | 115.78 | 122.1 | 2804.76 | 53.12 | 54.8 | 2793.29 | 101.1 | 104.6 | 2802.24 | 6.97 | 28.3 | 2788.14 |
| 7/3/2008 | 105.4 | 122.1 | 2815.14 | 49.73 | 54.8 | 2796.68 | 97.49 | 104.6 | 2805.85 | 4.65 | 28.3 | 2790.46 |
| 6/3/2008 | 87.52 | 122.1 | 2833.02 | 48.36 | 54.8 | 2798.06 | 90.71 | 104.6 | 2812.63 | 2.93 | 28.3 | 2792.18 |
| 5/20/2008 | 90.49 | 122.1 | 2830.05 | 48.17 | 54.8 | 2798.24 | 88 | 104.6 | 2815.34 | 2.67 | 28.3 | 2792.44 |
| 5/16/2008 | 91.34 | 122.1 | 2829.2 | 46.45 | 54.8 | 2799.96 | 88.4 | 104.6 | 2814.94 | 3.88 | 28.3 | 2791.23 |
| 4/23/2008 | 114.42 | 122.1 | 2806.12 | 50.16 | 54.8 | 2796.25 | 101.1 | 104.6 | 2802.24 | 7.6 | 28.3 | 2787.51 |
| 3/10/2008 | 119.65 | 122.1 | 2800.89 | 51.47 | 54.8 | 2794.94 | 103.53 | 104.6 | 2799.81 | 8.4 | 28.3 | 2786.71 |
| 2/7/2008 | 120.1 | 122.1 | 2800.44 | 51.2 | 54.8 | 2795.21 | 103.8 | 104.6 | 2799.54 | 8.55 | 28.3 | 2786.56 |
| 12/26/2007 | 120.34 | 122.1 | 2800.2 | 51.52 | 54.8 | 2794.89 | 103.98 | 104.6 | 2799.36 | 8.52 | 28.3 | 2786.59 |
| 11/9/2007 | 121.3 | 122.1 | 2799.24 | 51.65 | 54.8 | 2794.76 | 104 | 104.6 | 2799.34 | 8.75 | 28.3 | 2786.36 |
| 9/27/2007 | 119.12 | 122.1 | 2801.42 | 51.75 | 54.8 | 2794.66 | 103.12 | 104.6 | 2800.22 | 7.22 | 28.3 | 2787.89 |
| 5/8/2007 | 107.64 | 122.1 | 2812.9 | 49.57 | 54.8 | 2796.84 | 96.18 | 104.6 | 2807.16 | 5.22 | 28.3 | 2789.89 |
| 11/14/2006 | 119.21 | 122.1 | 2801.33 | 51.88 | 54.8 | 2794.53 | 102.72 | 104.6 | 2800.62 | 7.96 | 28.3 | 2787.15 |
| 10/30/2006 | 119.48 | 122.1 | 2801.06 | 51.82 | 54.8 | 2794.59 | 103.69 | 104.6 | 2799.65 | 7.92 | 28.3 | 2787.19 |

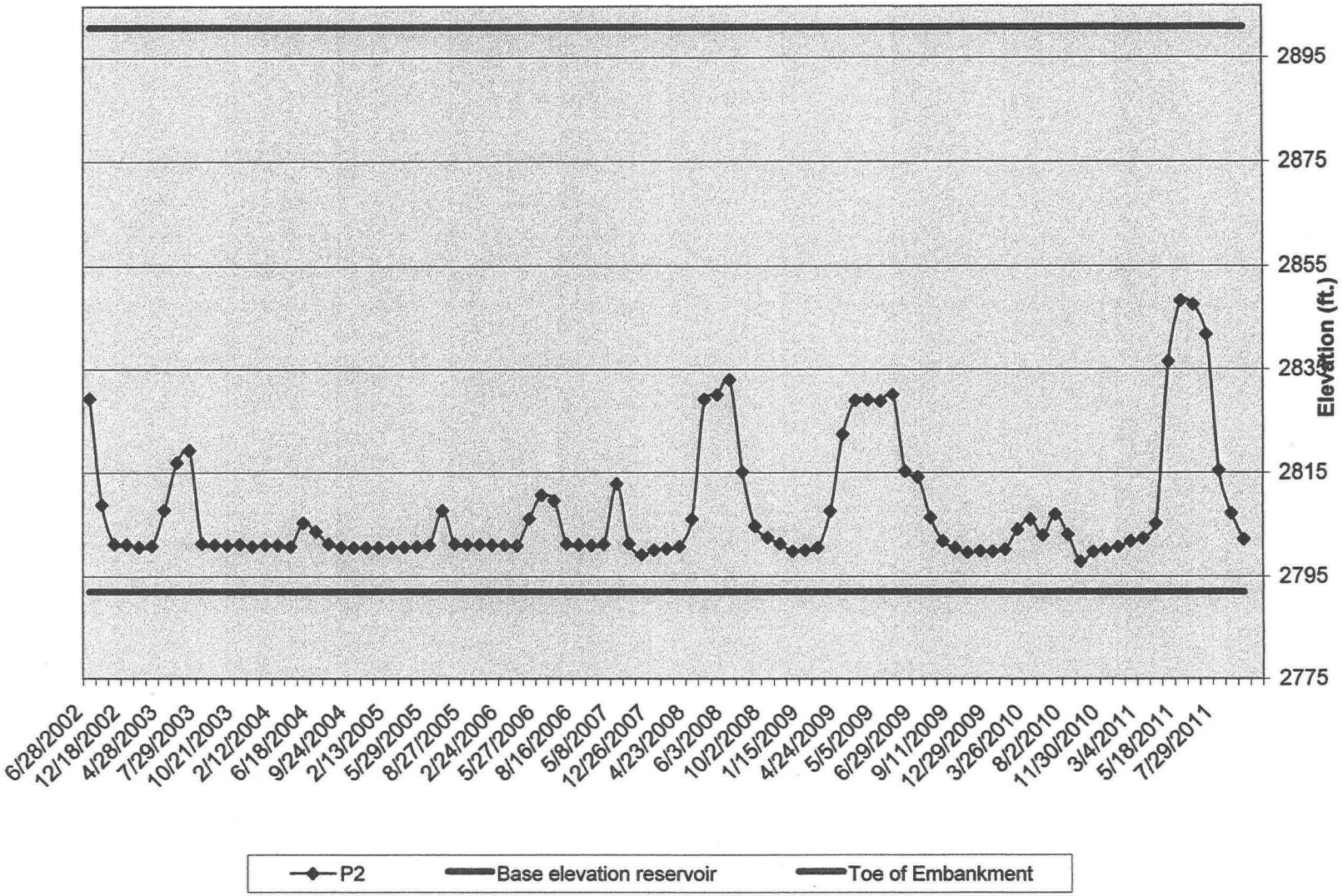
| Piezometer Num | P2 | | Elev. | PM1 | | Elev. | PM2 | | Elev. | A8 | | Elev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T.O.C.= | 2920.54 | | T.O.C.= | 2846.41 | | T.O.C.= | 2903.34 | | T.O.C.= | 2795.11 |
| Date | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev |
| 8/16/2006 | 119.39 | 122.1 | 2801.15 | 51.72 | 54.8 | 2794.69 | 103.51 | 104.6 | 2799.83 | 7.72 | 28.3 | 2787.39 |
| 7/28/2006 | 119.14 | 122.1 | 2801.4 | 51.61 | 54.8 | 2794.8 | 103.32 | 104.6 | 2800.02 | 7.42 | 28.3 | 2787.69 |
| 6/21/2006 | 110.89 | 122.1 | 2809.65 | 51.23 | 54.8 | 2795.18 | 101.62 | 104.6 | 2801.72 | 6.18 | 28.3 | 2788.93 |
| 5/27/2006 | 109.78 | 122.1 | 2810.76 | 50.76 | 54.8 | 2795.65 | 98.92 | 104.6 | 2804.42 | 4.98 | 28.3 | 2790.13 |
| 4/7/2006 | 114.34 | 122.1 | 2806.2 | 51.14 | 54.8 | 2795.27 | 99.79 | 104.6 | 2803.55 | 4.96 | 28.3 | 2790.15 |
| 3/12/2006 | 119.52 | 122.1 | 2801.02 | 51.62 | 54.8 | 2794.79 | 103.39 | 104.6 | 2799.95 | 6.18 | 28.3 | 2788.93 |
| 2/24/2006 | 119.44 | 122.1 | 2801.1 | 51.95 | 54.8 | 2794.46 | 103.79 | 104.6 | 2799.55 | 7.92 | 28.3 | 2787.19 |
| 10/27/2005 | 119.41 | 122.1 | 2801.13 | 51.94 | 54.8 | 2794.47 | 103.76 | 104.6 | 2799.58 | 7.81 | 28.3 | 2787.30 |
| 9/10/2005 | 119.32 | 122.1 | 2801.22 | 51.84 | 54.8 | 2794.57 | 103.66 | 104.6 | 2799.68 | 7.76 | 28.3 | 2787.35 |
| 8/27/2005 | 119.3 | 122.1 | 2801.24 | 51.78 | 54.8 | 2794.63 | 103.14 | 104.6 | 2800.2 | 7.68 | 28.3 | 2787.43 |
| 7/14/2005 | 119.22 | 122.1 | 2801.32 | 51.74 | 54.8 | 2794.67 | 103.46 | 104.6 | 2799.88 | 7.28 | 28.3 | 2787.83 |
| 6/24/2005 | 112.79 | 122.1 | 2807.75 | 51.68 | 54.8 | 2794.73 | 103.29 | 104.6 | 2800.05 | 6.22 | 28.3 | 2788.89 |
| 5/29/2005 | 119.42 | 122.1 | 2801.12 | 50.92 | 54.8 | 2795.49 | 103.01 | 104.6 | 2800.33 | 5.91 | 28.3 | 2789.20 |
| 4/10/2005 | 119.7 | 122.1 | 2800.84 | 51.72 | 54.8 | 2794.69 | 103.32 | 104.6 | 2800.02 | 5.42 | 28.3 | 2789.69 |
| 3/19/2005 | 119.82 | 122.1 | 2800.72 | 51.82 | 54.8 | 2794.59 | 103.49 | 104.6 | 2799.85 | 7.79 | 28.3 | 2787.32 |
| 2/13/2005 | 119.86 | 122.1 | 2800.68 | 51.87 | 54.8 | 2794.54 | 103.54 | 104.6 | 2799.8 | 7.86 | 28.3 | 2787.25 |
| 11/19/2004 | 119.9 | 122.1 | 2800.64 | 51.91 | 54.8 | 2794.5 | 103.59 | 104.6 | 2799.75 | 7.96 | 28.3 | 2787.15 |
| 10/17/2004 | 119.89 | 122.1 | 2800.65 | 51.84 | 54.8 | 2794.57 | 103.52 | 104.6 | 2799.82 | 7.91 | 28.3 | 2787.20 |
| 9/24/2004 | 119.91 | 122.1 | 2800.63 | 51.81 | 54.8 | 2794.6 | 103.49 | 104.6 | 2799.85 | 7.82 | 28.3 | 2787.29 |
| 8/17/2004 | 119.84 | 122.1 | 2800.7 | 51.79 | 54.8 | 2794.62 | 103.34 | 104.6 | 2800 | 7.79 | 28.3 | 2787.32 |
| 7/22/2004 | 119.21 | 122.1 | 2801.33 | 51.72 | 54.8 | 2794.69 | 103.29 | 104.6 | 2800.05 | 7.42 | 28.3 | 2787.69 |
| 6/18/2004 | 116.8 | 122.1 | 2803.74 | 50.69 | 54.8 | 2795.72 | 102.14 | 104.6 | 2801.2 | 7.01 | 28.3 | 2788.10 |
| 5/25/2004 | 115.14 | 122.1 | 2805.4 | 50.95 | 54.8 | 2795.46 | 101.34 | 104.6 | 2802 | 6.55 | 28.3 | 2788.56 |
| 3/19/2004 | 119.74 | 122.1 | 2800.8 | 51.68 | 54.8 | 2794.73 | 101.46 | 104.6 | 2801.88 | 7.8 | 28.3 | 2787.31 |
| 2/12/2004 | 119.45 | 122.1 | 2801.09 | 51.82 | 54.8 | 2794.59 | 103.52 | 104.6 | 2799.82 | 7.8 | 28.3 | 2787.31 |
| 12/10/2003 | 119.44 | 122.1 | 2801.1 | 51.86 | 54.8 | 2794.55 | 103.54 | 104.6 | 2799.8 | 7.91 | 28.3 | 2787.20 |
| 11/19/2003 | 119.72 | 122.1 | 2800.82 | 51.84 | 54.8 | 2794.57 | 103.59 | 104.6 | 2799.75 | 7.9 | 28.3 | 2787.21 |
| 10/21/2003 | 119.32 | 122.1 | 2801.22 | 51.84 | 54.8 | 2794.57 | 103.54 | 104.6 | 2799.8 | 7.94 | 28.3 | 2787.17 |
| 9/23/2003 | 119.51 | 122.1 | 2801.03 | 51.76 | 54.8 | 2794.65 | 103.49 | 104.6 | 2799.85 | 7.7 | 28.3 | 2787.41 |
| 8/26/2003 | 119.42 | 122.1 | 2801.12 | 51.62 | 54.8 | 2794.79 | 103.42 | 104.6 | 2799.92 | 7.68 | 28.3 | 2787.43 |

| Piezometer Num | P2 | | Elev. | PM1 | | Elev. | PM2 | | Elev. | A8 | | Elev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T.O.C.= | 2920.54 | | T.O.C.= | 2846.41 | | T.O.C.= | 2903.34 | | T.O.C.= | 2795.11 |
| Date | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev | DW | TD | WS Elev |
| 7/29/2003 | 119.16 | 122.1 | 2801.38 | 51.58 | 54.8 | 2794.83 | 103.38 | 104.6 | 2799.96 | 7.39 | 28.3 | 2787.72 |
| 6/14/2003 | 101.34 | 122.1 | 2819.2 | 50.62 | 54.8 | 2795.79 | 101.23 | 104.6 | 2802.11 | 6.22 | 28.3 | 2788.89 |
| 5/30/2003 | 103.62 | 122.1 | 2816.92 | 49.67 | 54.8 | 2796.74 | 94.67 | 104.6 | 2808.67 | 4.62 | 28.3 | 2790.49 |
| 4/28/2003 | 112.74 | 122.1 | 2807.8 | 50.02 | 54.8 | 2796.39 | 97.48 | 104.6 | 2805.86 | 3.41 | 28.3 | 2791.70 |
| 3/28/2003 | 119.62 | 122.1 | 2800.92 | 51.99 | 54.8 | 2794.42 | 102.91 | 104.6 | 2800.43 | 6.21 | 28.3 | 2788.90 |
| 2/24/2003 | 119.82 | 122.1 | 2800.72 | 52.74 | 54.8 | 2793.67 | 103.9 | 104.6 | 2799.44 | 7.62 | 28.3 | 2787.49 |
| 12/18/2002 | 119.34 | 122.1 | 2801.2 | 51.74 | 54.8 | 2794.67 | 103.36 | 104.6 | 2799.98 | 7.77 | 28.3 | 2787.34 |
| 9/30/2002 | 119.28 | 122.1 | 2801.26 | 51.55 | 54.8 | 2794.86 | 103.12 | 104.6 | 2800.22 | 7.22 | 28.3 | 2787.89 |
| 7/31/2002 | 111.72 | 122.1 | 2808.82 | 50.54 | 54.8 | 2795.87 | 98.87 | 104.6 | 2804.47 | 5.46 | 28.3 | 2789.65 |
| 6/28/2002 | 91.22 | 122.1 | 2829.32 | 48.82 | 54.8 | 2797.59 | 89.63 | 104.6 | 2813.71 | 2.62 | 28.3 | 2792.49 |

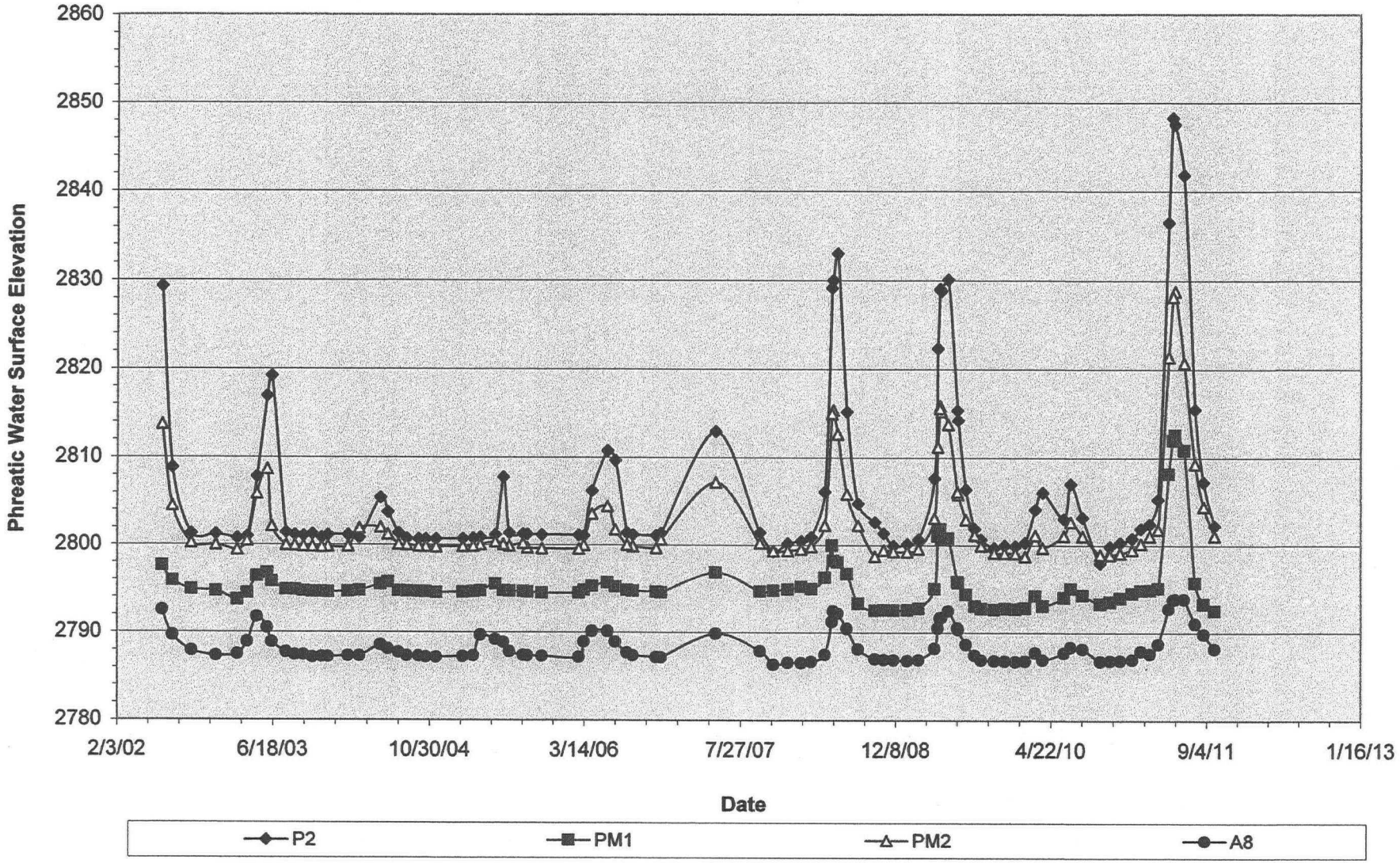
## KDID Piezometers 2009 to 2011
## with
## Reservoir Gauge Height



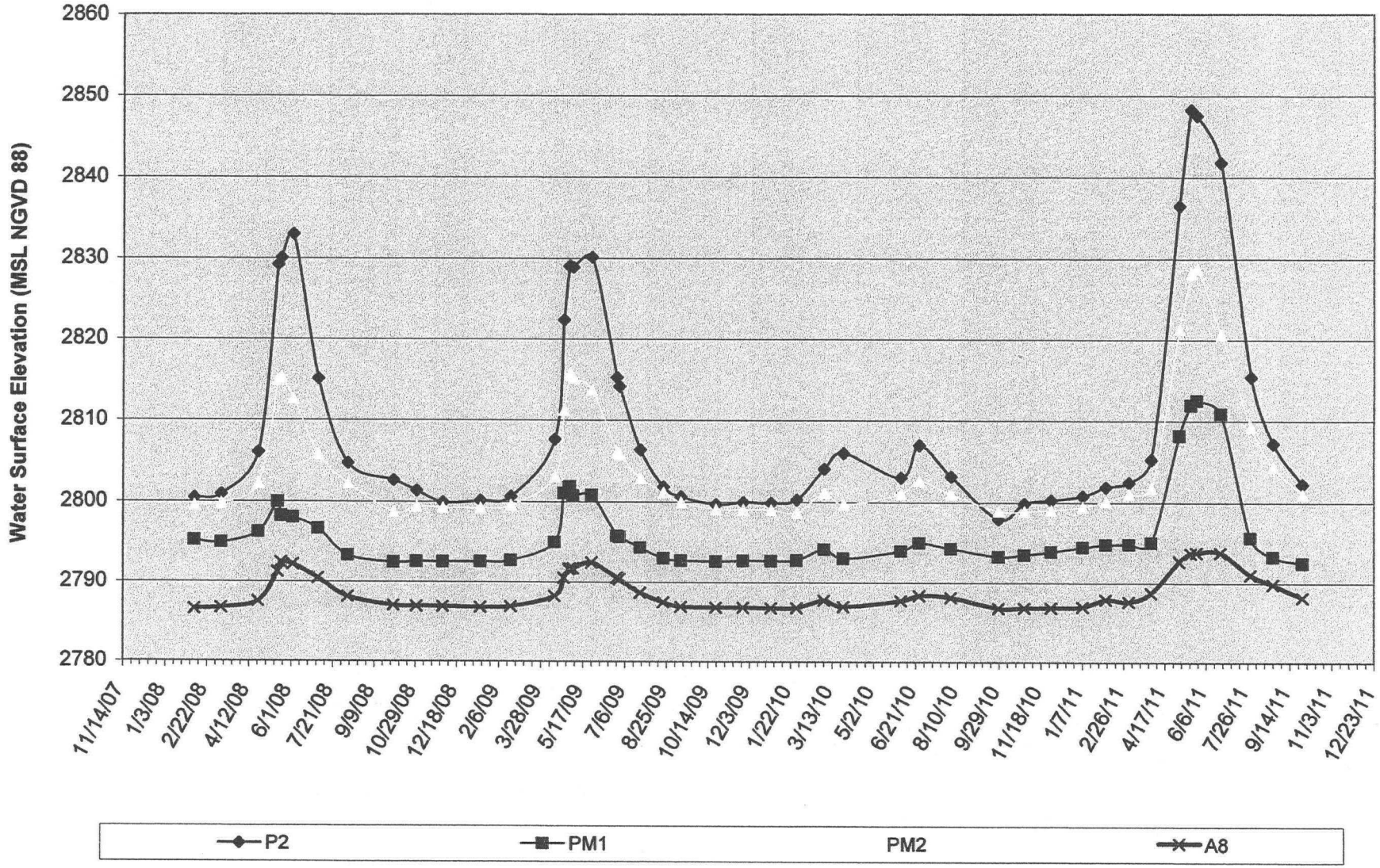
## KDID P2 and Base reservoir and Embankment Toe 2002 to 2011



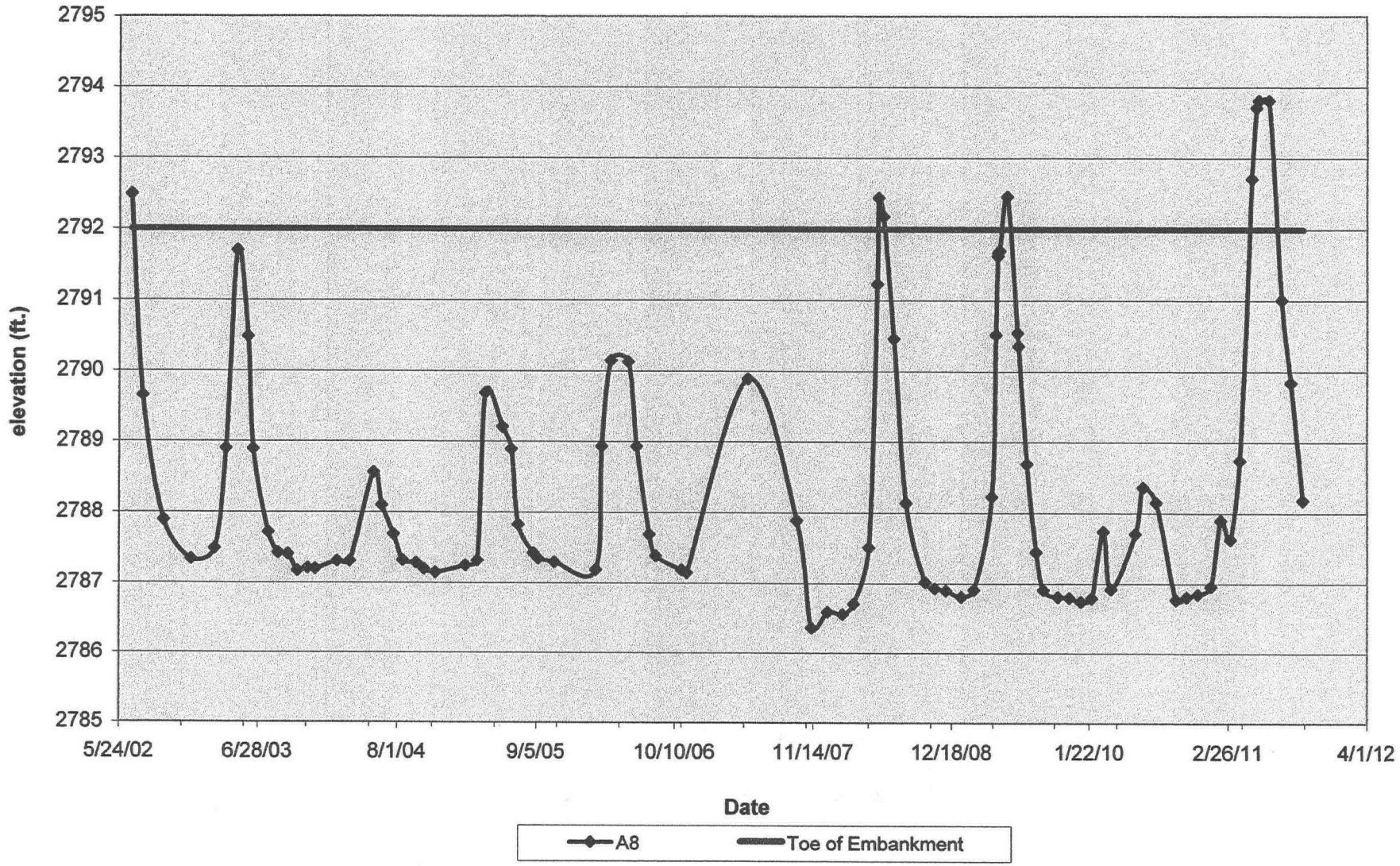
## KDID Piezometers July 1, 2002 to August 25, 2011

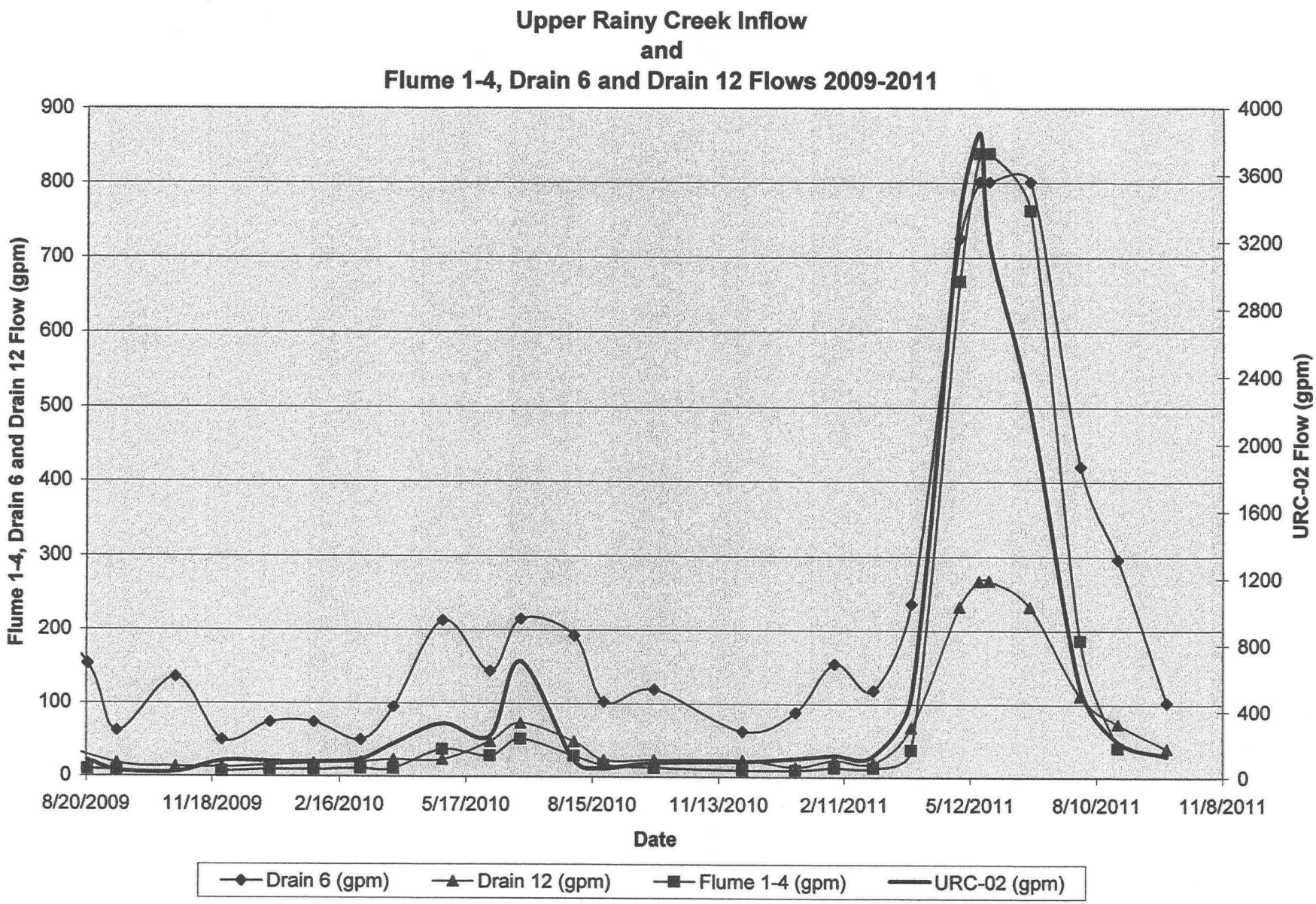


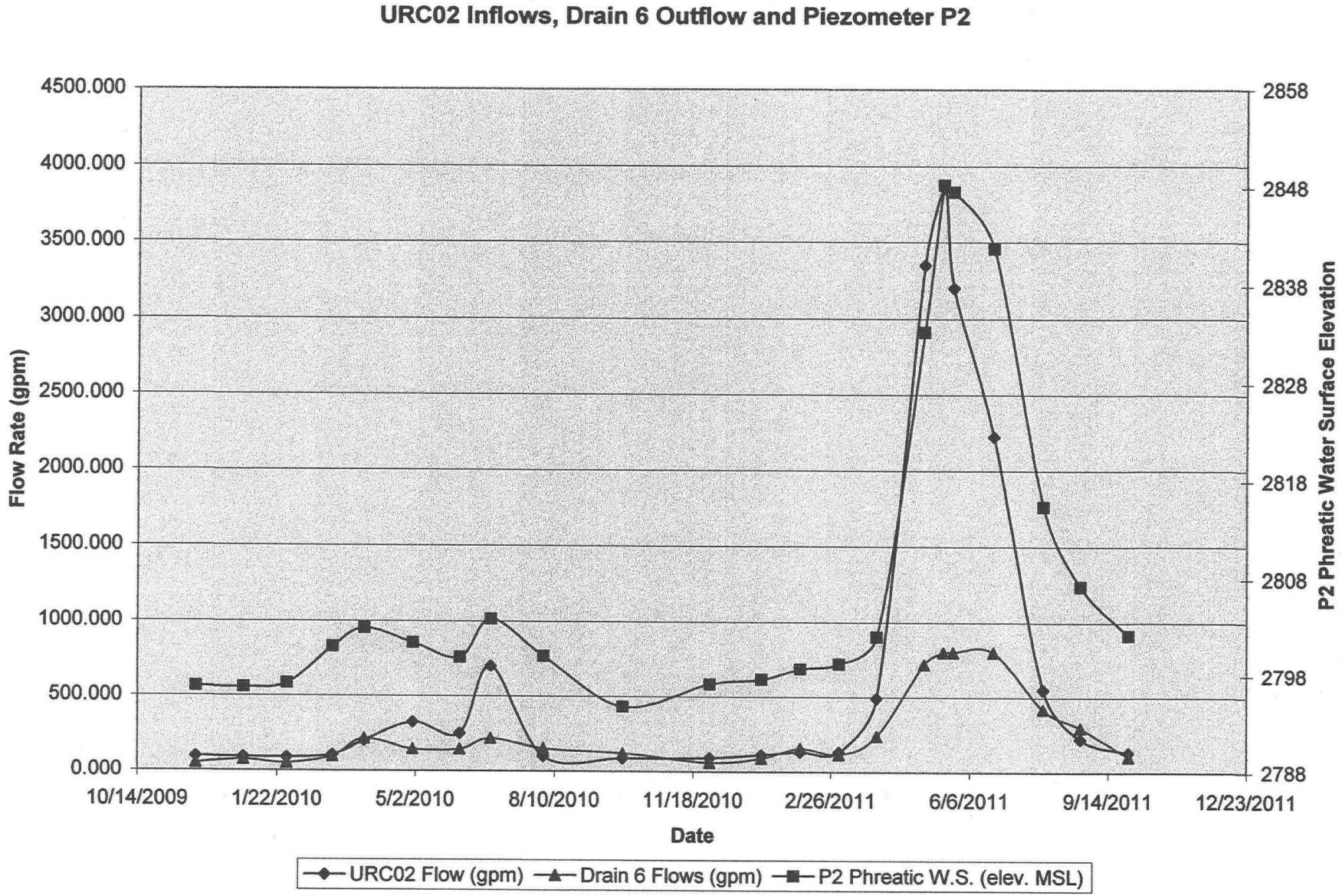
## KDID All "Wet" Piezometer Elevations 2008 - 2011



## KDID Piezometer A8 at the Toe of the Embankment




Upper Rainy Creek Inflow
and
Flume 1-4, Drain 6 and Drain 12 Flows 2009-2011
Flume 1-4, Drain 6 and Drain 12 Flow (gpm)
URC-02 Flow (gpm)
900
800
700
600
500
400
300
200
100
0
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0
8/20/2009
11/18/2009
2/16/2010
5/17/2010
8/15/2010
11/13/2010
2/11/2011
5/12/2011
8/10/2011
11/8/2011
Date
Drain 6 (gpm)
Drain 12 (gpm)
Flume 1-4 (gpm)
URC-02 (gpm)


URC02 Inflows, Drain 6 Outflow and Piezometer P2
Flow Rate (gpm)
4500.000
4000.000
3500.000
3000.000
2500.000
2000.000
1500.000
1000.000
500.000
0.000
P2 Phreatic Water Surface Elevation
2858
2848
2838
2828
2818
2808
2798
2788
10/14/2009
1/22/2010
5/2/2010
8/10/2010
11/18/2010
2/26/2011
6/6/2011
9/14/2011
12/23/2011
Date
URC02 Flow (gpm)
Drain 6 Flows (gpm)
P2 Phreatic W.S. (elev. MSL)